4.6 AIR QUALITY

This section describes existing ambient air quality conditions in the vicinity of the Cabrillo Port Liquefied Natural Gas Deepwater Port (the Project), air pollutant emissions associated with Project construction and operation, and the applicable major Federal, State, and local air quality regulations. Potential impacts on ambient air quality due to air pollutant emissions from the Project, as well as from alternatives to the Project, are identified. This section also summarizes the mitigation measures to be implemented to address these impacts.

Issues raised related to air quality during the public scoping and public comment periods for the October 2004 Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) and the March 2006 Revised Draft EIR are addressed. The air quality issues included identification of all Project-related and indirect air emissions, identification of specific emission offsets, availability of assumptions used in preparation of emission estimates and air quality impact analyses, sulfur content in natural gas and diesel, feasibility of best available control technology, air quality impacts during emergencies, air pollutant impacts on onshore and offshore areas due to Project construction and operation, the introduction of natural gas with elevated heating values, Federal operating permit applicability, mitigation measures, applicability of Ventura County rules, the Project's attainment designation, emissions in California Coastal Waters, applicability of the General Conformity Rule, greenhouse gas emissions/global warming, and cumulative air quality impacts.

The Applicant has revised the Project in several ways since the issuance of the March 2006 Revised Draft EIR. These changes are described in Section 1.4.2, "Changes to the Project and Analyses Since Publication of the March 2006 Revised Draft EIR." The following changes would reduce overall Project emissions of oxides of nitrogen (NO_x), reactive organic compounds (ROC), and carbon monoxide:

- Reduction in the number of LNG carriers and change in crew vessel trips;
- Use of natural gas to power LNG carriers in California Coastal Waters;
- Diesel-fueled support vessels with emission controls; and
- Use of specific engine standards for onshore construction equipment.

The Applicant has committed to implement the following additional measure to reduce air emissions:

- Repowering of existing non-Project vessels with cleaner-burning engines.

These changes required revisions to air pollutant emission estimates and related air quality analyses. Additional information on these changes is presented in this section.

4.6.1 Environmental Setting

4.6.1.1 Air Pollutants

Air pollutants originate from a wide variety of man-made and natural sources. Air pollution can directly impact the health of human beings, animals, and plants; reduce visibility; and cause distress to structures and buildings. Air pollution can also potentially contribute to climate change.

The Federal Clean Air Act (CAA) designates seven criteria pollutants for which primary and secondary National Ambient Air Quality Standards (NAAQS) have been promulgated. Primary standards are designed to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards are set to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. The seven criteria air pollutants are:

- Carbon monoxide (CO);
- Lead;
- Nitrogen dioxide (NO_2);
- Ozone;
- Particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10});
- Particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$); and
- Sulfur dioxide (SO_2).

The State of California has established additional and/or more stringent ambient air quality standards for some of these criteria pollutants, as well as ambient air quality standards for sulfates, hydrogen sulfide (H_2S), vinyl chloride, and visibility-reducing particles. NAAQS and State Ambient Air Quality Standards are summarized in Table 4.6-1.

Toxic air pollutants, also known as hazardous air pollutants, are those pollutants that are known or suspected to cause immediate or long-term serious health effects such as cancer, reproductive effects or birth defects, or adverse environmental effects. Examples of toxic air pollutants include asbestos, benzene, dioxin, mercury, and methylene chloride. Ambient air quality standards, in general, have not been established for these pollutants. However, Federal, State, and local regulations and guidelines have been established to reduce their release to the air.

Table 4.6-1 Summary of National and State Ambient Air Quality Standards

Pollutant	Averaging Time	National Ambient Air Quality Standards		California Ambient Air Quality Standards
		Primary	Secondary	
CO	8-hour	9 ppm[b]	-	9.0 ppm
	1-hour	35 ppm[b]	-	20 ppm
Lead	Quarter	1.5 µg/m^3	-	-
	30-day	-	-	1.5 µg/m^3
NO_2	Annual	0.053 ppm	0.053 ppm	-
	1-hour	-	-	0.25 ppm
Ozone	8-hour	0.08 ppm[c]	0.08 ppm[c]	0.070 ppm
	1-hour[a]	-	-	0.09 ppm
PM_{10}	Annual	[d]	[d]	20 µg/m^3
	24-hour	150 µg/m^3[e]	150 µg/m^3[e]	50 µg/m^3
$PM_{2.5}$	Annual	15.0 µg/m^3	15.0 µg/m^3	12 µg/m^3
	24-hour	35 µg/m^3[f]	-	-
SO_2	Annual	0.030 ppm	-	-
	24-hour	0.14 ppm[b]	-	0.04 ppm
	3-hour	-	0.5 ppm[b]	-
	1-hour	-	-	0.25 ppm
Sulfates	24-hour	-	-	25 µg/m^3
H_2S	24-hour	-	-	0.03 ppm
Vinyl chloride	24-hour	-	-	0.010 ppm
Visibility reducing particles	8-hour (10 am - 6 pm)	-	-	Reduce the visual range to less than 10 miles at a relative humidity less than 70 percent

Sources: 40 CFR Part 50; 17 CCR §§ 70100–70201.
Key:
µg/m^3 = micrograms per cubic meter
ppm = parts per million
Notes:
[a]1-hour ozone NAAQS was replaced with the 8-hour ozone NAAQS on June 15, 2005.
[b]Not to be exceeded more than once per year.
[c]To attain this standard, the 3-year average of the fourth highest daily maximum 8-hour average concentration over year must not exceed the standard.
[d]USEPA revoked the annual PM_{10} standard (effective December 17, 2006).
[e]Standard is attained when the expected number of violations is one or less each year.
[f]To attain this standard, the 3-year average of the 98th percentile must not exceed the standard.

Some gases in the atmosphere affect the Earth's heat balance by absorbing infrared radiation. These layers of gas in the atmosphere can prevent the escape of heat much the same as glass in a greenhouse. Thus, global warming is often referred to as the "greenhouse effect." The gases most responsible for global warming are carbon dioxide (CO_2) and methane. It is becoming more widely accepted that continued increases in greenhouse gases will contribute to global warming, although there is uncertainty concerning the magnitude and timing of the warming trend.

4.6.1.2 Existing Air Quality

California is divided into 15 air basins. Air basin boundaries were established by grouping counties or portions of counties with similar geographic features. One or more local air districts administer air quality management within each basin. The California Air Resources Board (CARB), local air districts, private contractors, and the National Park Service operate ambient air monitoring stations to characterize ambient air quality throughout these air basins.

The various phases of Project construction and operation would occur within Ventura County, northwestern Los Angeles County, and in Federal and State waters. For the purposes of this document, Federal waters are defined as the Pacific Ocean outside of the boundaries of any county of California, i.e., beyond 3 nautical miles (NM) (3.5 miles or 5.6 kilometers [km]) of the mean high tide line of any mainland or island coastline.

For the purposes of analyzing potential air quality impacts due to offshore air emission sources, the CARB has defined California Coastal Waters as extending approximately 25 to 100 miles (40 to 161 km) from the California coastline (17 California Code of Regulations [CCR] § 70500). California Coastal Waters incorporate a portion of Federal waters. Pollutant emissions released over these waters are likely to remain relatively close to the surface and be transported to the California coast and inland under prevailing summertime conditions. Pollutant emissions released somewhat to the west of these waters in summer are likely to be transported southward, parallel to the coast. Emissions released well west of these waters are likely to be transported southwestward, away from the coast (CARB 1984).

The proposed Center Road Pipeline route would be in Ventura County and the proposed Loop 225 Pipeline route would be in Los Angeles County (within the South Coast Air Basin). The floating storage and regasification unit (FSRU) would be moored in Federal waters offshore of Ventura County.

Ventura County is part of the South Central Coast Air Basin, which comprises Ventura, Santa Barbara, and San Luis Obispo Counties. The air over mainland Ventura County often exhibits weak vertical and horizontal dispersion characteristics, which limit the dispersion of emissions and cause increased ambient air pollutant levels. Persistent temperature inversions, i.e., temperature increases as height increases, act as a "ceiling" that prevents pollutants from rising and dispersing (see discussion and Figure 4.1-4 in Section 4.1.8.5, "Meteorology and Climate"). Mountain ranges act as “walls” that inhibit horizontal dispersion of air pollutants. The diurnal land/sea breeze pattern common in Ventura County transports air pollutants toward the ocean during the early morning by the land breeze and toward land during the afternoon by the sea breeze. This creates a “sloshing” effect, causing pollutants to remain in the area for several days. Residual emissions from previous days accumulate and chemically react with new emissions in the presence of sunlight, thereby increasing ambient air pollutant levels. This pollutant “sloshing” effect happens most predominantly from May through October (known as the “smog season”). Air temperatures are usually higher and sunlight more intense during the smog season. This explains why Ventura County

experiences the most exceedances of the State and Federal ozone standards during this six-month period (Ventura County Air Pollution Control District [VCAPCD] 2003).

The South Coast Air Basin is comprised of Orange County and the non-desert portions of Los Angeles, San Bernardino, and Riverside Counties. The South Coast Air Basin is surrounded by mountains on three sides and the Pacific Ocean on the remaining side. The mountains often serve as a barrier when regional scale winds are weak. Under these conditions, air pollutants are not transported out of the basin, resulting in the build-up of pollutant concentrations. Prevailing wind patterns off the ocean carry pollutants eastward across the basin, enabling continual photochemical reactions to occur as new emissions are added to existing pollutant concentrations. Intense sunlight, present at the latitude of the basin, provides the ultraviolet light necessary to fuel the photochemical reactions that produce ozone. Compared with other urban areas in the U.S., metropolitan Los Angeles has a low average wind speed. Mild sea breezes slowly carry pollutants inland. In the summer, temperature inversions are stronger than in winter and prevent ozone and other pollutants from escaping upward and dispersing. In the winter, a ground-level or surface inversion commonly forms during the night and traps vehicle emissions during the morning rush hours (SCAQMD 1993).

The U.S. Environmental Protection Agency (USEPA) compares ambient air criteria pollutant measurements with NAAQS to assess the status of air quality of regions within the states of the U.S. with respect to criteria air pollutants. Similarly, the CARB compares air pollutant measurements in California to State Ambient Air Quality Standards. Based on these comparisons, regions within the states of the U.S. and California are designated as one of the following categories:

- **Attainment.** A region is designated as attainment if monitoring shows ambient concentrations of a specific pollutant are less than or equal to NAAQS or State Ambient Air Quality Standards.
- **Nonattainment.** If the NAAQS or State Ambient Air Quality Standard is exceeded for a pollutant, then the region is designated as nonattainment for that pollutant. Nonattainment areas are further classified based on the severity of the exceedance of the relevant standard.
- Unclassifiable. An area is designated as unclassifiable if the ambient air monitoring data are incomplete and do not support a designation of attainment or nonattainment.

The Channel Islands are located in the Pacific Ocean off the coast of California. Each of these islands is a part of Ventura County, Santa Barbara County, or Los Angeles County. Under Federal regulations, the Channel Islands that are part of Ventura or Santa Barbara County (and in the South Central Coast Air Basin) have separate air quality designations from the other parts of these counties. However, islands that are part of Los Angeles County, i.e., Catalina Island and San Clemente Island, are included with the rest of the Los Angeles County portion of the South Coast Air Basin for Federal air quality designations. California regulations do not contain separate air quality designations for any Channel Islands. The FSRU would be located in Federal waters

12.0 NM (13.8 or 22.2 km) south of mainland Ventura County, 18.71 NM (21.5 miles or 34.6 km) southeast of Anacapa Island, and approximately 42 NM (48.3 miles or 77.7 km) northeast of San Nicolas Island. Anacapa Island and San Nicolas Island are part of Ventura County.

A summary of the air quality designations of Ventura County, the Channel Islands, and the portion of Los Angeles County within the South Coast Air Basin is presented in Table 4.6-2. Federal designations of air quality are defined in the Code of Federal Regulations (CFR), Title 40, Part 81 (40 CFR Part 81). State designations are defined in 17 CCR §§ 60201–60210.

Table 4.6-2 Attainment Status of Areas of Project Activity

Pollutant	Ventura County		Channel Islands[a]		Los Angeles County[b]	
	NAAQS	California Ambient Air Quality Standards	NAAQS	California Ambient Air Quality Standards	NAAQS	California Ambient Air Quality Standards
CO	U/A	A	U/A	A	Serious NA	A
Lead	U/A	A	U/A	A	U/A	A
NO_2	U/A	A	U/A	A	A/M	A
Ozone[c]	Moderate NA	NA	U/A	NA	Severe NA	NA
PM_{10}	U	NA	U	NA	Serious NA	NA
$PM_{2.5}$	U/A	NA	U/A	NA	NA	NA
SO_2	A	A	U	A	A	A
Sulfates	-	A	-	A	-	A
H_2S	-	U	-	U	-	U
Vinyl Chloride	-	U	-	U	-	U
Visibility reducing particles	-	U	-	U	-	U

Sources: 40 CFR § 81.305; 17 CCR §§ 60201–60210.

Key:

A = attainment

A/M = attainment designated as maintenance area due to prior nonattainment designation

NA = nonattainment

U/A = unclassifiable/attainment

U = unclassifiable

Extreme, severe, serious, and moderate are rankings for nonattainment status in descending order.

Notes:

[a]Refers to Channel Islands in Ventura County. Under Federal regulations, separate NAAQS designations have been established for the Channel Islands. Under State regulations, designations with respect to California Ambient Air Quality Standards for the Channel Islands (within Ventura County) are the same as those for the rest of Ventura County.

[b]Includes only the portion of Los Angeles County within the South Coast Air Basin.

[c]Status compared with NAAQS based on 8-hr averaging time; status compared with California Standards based on 1-hr averaging time.

According to the USEPA, the portions of the Pacific Ocean that are beyond the federally recognized limit of California, i.e., in Federal waters, have not been designated with respect to NAAQS (Zimpfer 2005).

4.6.1.3 Regulated Air Pollutant Emissions

Air pollutant emissions would be generated during Project-related construction activities and facility operations. The primary regulated air pollutants from Project-related emission sources include:

- Criteria pollutants[1], except lead; and
- Ammonia (NH_3).

Project activities are also expected to emit toxic air contaminants.

Regulated Air Pollutant Emissions – Construction Activities

During Project-related construction activities, air pollutant emissions would be produced primarily from internal combustion engines used in vessels, vehicles, and equipment. Fugitive dust would also be generated by the operation of trucks and earth-moving equipment in off-road areas. Project construction would entail:

- Installation of the mooring and tie-in of the FSRU in Federal waters;
- Installation of offshore pipelines in Federal and State waters;
- Drilling of a shoreline pipeline crossing and pipeline installation at Ormond Beach in Ventura County;
- Installation of the onshore Center Road Pipeline in Ventura County; and
- Installation of the onshore Line 225 Pipeline Loop in Los Angeles County.

Marine vessels would be used during the installation of the mooring structure, FSRU, and offshore pipelines. Vessel emission sources include diesel-fueled reciprocating internal combustion engines. Table 4.6-3 presents a summary of the anticipated types of vessels, engine ratings, and duration of operations used to estimate air pollutant emissions from the mooring and FSRU installation.

[1] Ozone is not emitted directly from emission sources but is created at near-ground level by a chemical reaction between NO_x and ROCs in the presence of sunlight. As a result, NO_x and ROCs are often referred to as ozone precursors and are regulated as a means to prevent ozone formation.

Table 4.6-3 Mooring and FSRU Installation Equipment

Equipment Type	Total Engine Rating (hp)	Average Operating Load (percent)	Duration of Activity (days)	Average Daily Operation (hours/day)
Two anchor handling towing/supply vessels	30,000	10	20	24 (standby)
Crew boat	1,500	23	20	2 (cruising) 14 (standby)
Construction barge	8,000	43	20	12 (operating) 12 (standby)
Tug	6,500	9	20	2 (assisting) 22 (standby)
Oceangoing tug	25,000	20	1	2 (assisting) 22 (standby)

Note:
hp = horsepower.

The air pollutant sources during offshore pipeline installation include diesel-fueled reciprocating internal combustion engines on marine vessels. A summary of the anticipated types of vessels, engine ratings, and duration of operations used to estimate air pollutant emissions is presented in Table 4.6-4.

Table 4.6-4 Offshore Pipeline Installation Equipment

Equipment Type	Total Engine Rating (hp)	Average Operating Load (percent)	Duration of Activity (days)	Average Daily Operation (hours/day)
Dynamically positioned pipelaying vessel	25,000	47	35	12 (operating) 12 (standby)
Two anchor handling towing/supply vessels	30,000	10	35	24 (standby)
Crew boat	1,500	23	35	2 (cruising) 14 (standby)
Tug and pipe barge	4,000	26	10	4 (cruising) 12 (standby)
35-ton dock crane	130	80	1	8 (operating)

Note:
hp = horsepower.

The subsea pipelines would come ashore and extend beneath Ormond Beach and terminate at the existing Reliant Energy Ormond Beach Generating Station. Horizontal directional boring (HDB) technology would be used to install the pipelines below the beach. Two borings, one for each pipeline, would be drilled to cross the shore at the landfall site. A summary of the anticipated types of equipment, engine ratings, and

duration of operations used to estimate air pollutant emissions from shore crossing activities is presented in Table 4.6-5.

Table 4.6-5 Shore Crossing Construction Equipment

Equipment Type	Total Engine Rating (hp)	Average Operating Load (percent)	Duration of Activity[a]	Average Daily Operation[a]
Small drilling rig (offshore)	400	40	60 days	24 hr/day
Exit hole barge tug	4,000	5	35 days	24 hr/day
Anchor handling towing/supply vessel	15,000	10	35 days	24 hr/day
HDB equipment[b]	2,000	100	60 days (88 shifts)	12 hr/shift
Auxiliary portable equipment[c]	1,100	80	60 days (85 shifts)	12 hr/shift
All terrain forklift	100	30	60 days	12 hr/day
18-wheeler truck	-	-	60 days	60 miles/day

Notes:

hp = horsepower.

[a]The number of days used for the emissions estimates do not necessarily correspond with the number of construction days described in Chapter 2, " Description of the Proposed Action." In estimating emissions, the Applicant estimated the number of days and hours that the equipment would actually be operating. In contrast, the length of time used for the construction estimates in Chapter 2 reflects the total amount of time for site preparation, construction, anticipated downtime, and site cleanup.

[b]One in-hole head drive unit and one thrusting apparatus for only 6 hr/shift, and two mud pumps and one solids control unit (for only 9 hr/shift).

[c]One electrical generator; one mobile crane (for only 3.6 hr/shift); and three welding units (for only 6 hr/shift).

Two new onshore pipelines also would be constructed: the Center Road Pipeline in Ventura County and the Line 225 Loop Pipeline in Los Angeles County. These pipelines, along with associated facilities such as a metering station for the Center Road Pipeline, a backup odorant injection system, and block valves on both pipelines, would be installed where existing pipelines are not large enough to accommodate the proposed additional supply. The Center Road Pipeline would include installation of approximately 14.7 miles (23.7 km) of pipeline from the Reliant Energy Ormond Beach Generating Station to the Center Road Valve Station. The proposed Line 225 Loop Pipeline would include installation of approximately 7.7 miles (12.4 km) of pipeline between Quigley Valve Station and the Honor Rancho Storage Facility.

Onshore pipeline construction would be conducted using two “spreads” (workers and equipment) for the Center Road Pipeline and one spread for the Line 225 Loop Pipeline. These spreads would be working concurrently at different locations. Pipeline installation would proceed in the following general order: (1) pre-construction activities, e.g., surveying, staking, clearing, pavement cutting; (2) trenching; (3) hauling, stringing, and bending the line pipe; (4) lowering in, line-up, and welding; (5) weld inspection; (6) application of protective coating to weld joints; (7) backfilling; (8) right-of-way (ROW) cleanup, paving, and restoration; and (9) hydrostatic testing.

Several water bodies would be crossed during onshore pipeline installation. The proposed methods for crossing the different water bodies include:

- Slick bore (uncased horizontal conventional bore);
- Cased bore (same as slick bore except pipe is enclosed in steel casing);
- Pipeline span (subaerial exposure);
- Pipe bridge installation;
- Trenching; or
- Hanging pipe under existing bridge structures.

Air pollutant emissions from the onshore pipeline installation activities would be generated by diesel and gasoline-fueled reciprocating internal combustion engines in construction equipment and trucks. Fugitive dust would also be caused by the operation of trucks and earth-moving equipment in off-road areas. Air pollutant emissions during onshore construction activities would also be generated from motor vehicles associated with worker commute trips. Offsite motor vehicle travel during offshore construction activities is anticipated to be minimal since pipeline-laying barges typically house the workers onboard, thus eliminating the need for daily commuting.

Summaries of the anticipated types of equipment, engine ratings, and duration of operations used to estimate air pollutant emissions during all onshore pipeline installation activities are presented as follows:

- Trenching, including pre-construction activities (Table 4.6-6);
- Pipelaying, including activities from hauling, stringing, and bending the line pipe through hydrostatic testing (Table 4.6-7);
- Boring, for all waterways in Ventura County (Table 4.6-8); and
- Drilling, including horizontal directional drilling (HDD), for all waterways in Los Angeles County (Table 4.6-9).

The Applicant has specified that the following fugitive dust control measures would be implemented during onshore construction activities to reduce dust emissions:

- Excavation and moist spoils would be watered down;
- Spoil piles that remain more than a few weeks would be covered with tarps;
- Water trucks would be used for dust suppression; and
- Disturbed areas not covered with surface structures, such as buildings and pavements, would be stabilized following construction activities. This stabilization may involve planting these areas with suitable vegetation to minimize future on-site soil loss and off-site sedimentation.

Table 4.6-6 Onshore Pipeline Installation Equipment – Trenching

Equipment Type	Total Engine Rating (hp)	Average Operating Load (percent)	Duration of Activity[a] (days)	Average Daily Operation[a] (hours/day)
Concrete saw	50	50	180	12
Trenching machine	1,000	80	180	12
Track backhoe	500	80	180	12
Front loader	200	50	180	12
Bulldozer	200	50	180	12
Dragline	200	50	180	12

Notes:

hp = horsepower.

[a]The number of days used for the emissions estimates do not necessarily correspond with the number of construction days described in Chapter 2, "Description of the Proposed Action." In estimating emissions, the Applicant estimated the number of days and hours that the equipment would actually be operating. In contrast, the length of time used for the construction estimates in Chapter 2 reflects the total amount of time for site preparation, construction, anticipated downtime, and site cleanup.

Table 4.6-7 Onshore Pipeline Installation Equipment – Pipelaying

Equipment Type	Total Engine Rating (hp)	Average Operating Load (percent)	Duration of Activity[a] (days)	Average Daily Operation[a] (hours/day)
Miscellaneous trucks[b]	-	-	180	4
Pipe-bending machine	100	50	90	12
Auxiliary equipment[c]	1,700	50	180	12
Two dewatering pumps	100	50	30	12
Hydrostatic test pump	200	50	30	12
Cement/asphalt equipment[d]	400	50	90	12

Notes:

hp = horsepower.

[a]The number of days used for the emissions estimates do not necessarily correspond with the number of construction days described in Chapter 2, "Description of the Proposed Action." In estimating emissions, the Applicant estimated the number of days and hours that the equipment would actually be operating. In contrast, the length of time used for the construction estimates in Chapter 2, reflects the total amount of time for site preparation, construction, anticipated downtime, and site cleanup.

[b]Two dump trucks, two water trucks, two utility trucks, two pipe stringing trucks, two cement trucks, two asphalt trucks, and a lowboy truck.

[c]One heavy forklift, two sideboom tractors, one mobile crane, two welding generators, two utility compressors, two air compressors, one fill dirt screener, one sheepsfoot compactor, two vibratory rollers, and two hydraulic tampers.

[d]One cement pump, one asphalt paving machine, and one asphalt roller.

Table 4.6-8 Onshore Pipeline Installation Equipment – Boring

Equipment Type	Total Engine Rating (hp)	Average Operating Load (percent)	Duration of Activity[a] (days)	Average Daily Operation[a] (hours/day)
Horizontal boring rig	1,000	80	30	24
Track backhoe	200	50	30	12
All terrain forklift	100	50	30	12
Six light towers	120	100	30	12
Heavy lift crane	500	50	30	6
Two 18-wheeler trucks	-	-	30	4

Notes:

hp = horsepower.

[a]The number of days used for the emissions estimates do not necessarily correspond with the number of construction days described in Chapter 2, "Description of the Proposed Action." In estimating emissions, the Applicant estimated the number of days and hours that the equipment would actually be operating. In contrast, the length of time used for the construction estimates in Chapter 2 reflects the total amount of time for site preparation, construction, anticipated downtime, and site cleanup.

Table 4.6-9 Onshore Pipeline Installation Equipment – Horizontal Directional Drilling

Equipment Type	Total Engine Rating (hp)	Average Operating Load (percent)	Duration of Activity[a] (days)	Average Daily Operation[a] (hours/day)
Two large drilling rigs (HDD)	1,000	80	30	24
Auxiliary drilling equipment[b]	1,700	80	30	24
Track backhoe	200	50	30	12
All terrain forklift	100	50	30	12
Six light towers	120	100	30	12
Heavy lift crane	500	50	30	6
Two 18-wheeler trucks	-	-	30	4

Notes:

hp = horsepower.

[a]The number of days used for the emissions estimates do not necessarily correspond with the number of construction days described in Chapter 2, "Description of the Proposed Action." In estimating emissions, the Applicant estimated of the number of days and hours that the equipment would actually be operating. In contrast, the length of time used for the construction estimates in Chapter 2 reflects the total amount of time for site preparation, construction, anticipated downtime, and site cleanup.

[b]One mud cleaner generator, two mud pumps, and four fluid handling pumps.

Since 1994, the USEPA has adopted increasingly stringent emission standards for engines manufactured and sold for use in nonroad equipment. These sets of emission standards, identified as “tiers,” are gradually introduced with specific deadlines for implementation. A higher tier number corresponds to a more stringent emission standard, with Tier 4 representing the highest tier. To reduce construction emissions, the Applicant would use onshore construction equipment with engines that comply with USEPA Tier 2 engine standards, at a minimum. Where feasible, onshore equipment engines would meet USEPA Tier 3 or Tier 4 engine standards.

The peak daily air pollutant emissions expected from each phase of construction are summarized in Table 4.6-10. Some of these activities may occur concurrently. Estimates of total air pollutant emissions due to construction are presented in Table 4.6-11. Total emissions have been separated based on the locations of the proposed construction activities, i.e., within Ventura County, Los Angeles County, or Federal waters. These daily and total emissions incorporate all control measures proposed by the Applicant. A discussion of emission reductions associated with required mitigation measures is provided in Section 4.6.4. The methodology and assumptions used to develop these emission estimates are outlined in Appendix G1.

Table 4.6-10 Daily Air Pollutant Emissions from Project Construction Activities

Construction Activity[a]	Daily Emissions (pounds per day)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	ROCs	SO_2
FSRU mooring installation	5,512	4,474	259	259	648	3.1
Offshore pipeline installation	7,050	5,725	332	332	830	4.0
Shore crossing construction	1,029	1,140	94	63	191	0.9
Onshore pipeline – trenching	179	193	21	14	43	0.3
Onshore pipeline – pipelaying	979	187	143	43	60	1.3
Onshore pipeline – boring	146	260	53	21	53	0.3
Onshore pipeline – HDD	347	616	65	34	125	0.6
Worker commuting	212	14	4	4	7	1.8

Notes:

[a]As appropriate, comparisons of combined daily emissions from concurrent construction activities to relevant significance thresholds are presented in Section 4.6.4, "Impacts Analysis and Mitigation."

Table 4.6-11 Total Air Pollutant Emissions from Project Construction Activities

Area	Construction Activity	Emissions (tons)					
		CO	NO_x	PM_{10}	$PM_{2.5}$	ROCs	SO_2
Ventura County	Offshore pipelines	17.9	14.5	0.8	0.8	2.1	0.010
	Shore crossing	23.5	30.5	2.5	1.6	5.5	0.027
	Onshore pipeline	63.1	24.7	9.9	3.4	6.4	0.087
	Worker commuting	7.9	0.5	0.1	0.1	0.25	0.07
	Subtotal	**112.5**	**70.3**	**13.3**	**6.0**	**14.1**	**0.19**
Los Angeles County	Onshore pipeline	35.7	19.6	5.5	2.1	4.7	0.05
	Worker commuting	6.1	0.4	0.1	0.1	0.2	0.05
	Subtotal	**41.8**	**20.0**	**5.6**	**2.2**	**4.8**	**0.10**
Federal waters	FSRU mooring	33.8	27.4	1.6	1.6	4.0	0.02
	Offshore pipelaying	101.5	82.4	4.8	4.8	11.9	0.06
	Subtotal	**135.3**	**109.8**	**6.4**	**6.4**	**15.9**	**0.08**
Total		**290**	**200**	**25**	**15**	**35**	**0.37**

Regulated Air Pollutant Emissions – Stationary Operations

The CARB states, "From an air quality perspective, all emissions associated with the Project must be included in the analysis. Directly associated emissions are those that would not occur 'but for' the Project. With the proposed Cabrillo Port Project, vessel emissions of visiting LNG carriers are direct emissions. These emissions must be counted in determining the impact of the proposed Project and whether the impact has the potential to have a significant adverse affect on air quality" (Scheible 2006). During normal Project operations, air pollutant emissions would be generated from stationary sources on the FSRU and from marine vessels, i.e., LNG carriers, support tugs, and a crew boat.

FSRU stationary sources include the following equipment:

- Four 8,250-kilowatt (kW) generators, each powered by a dual-fuel reciprocating internal combustion engine;
- Eight submerged combustion vaporizers, each fitted with a natural gas burner with an input fuel rate of 115 million British thermal units per hour (MMBtu/hr);
- An inert gas generator (IGG), fitted with a natural gas burner with a capacity to generate 20,000 normalized cubic meters (m^3) per hour of inert gas, which is primarily a mixture of nitrogen and CO_2;
- One 4,200-kW emergency generator powered by a diesel engine;
- One 600-kW diesel emergency firewater pump engine;
- One 56-kW diesel freefall lifeboat engine; and
- One 145,000-gallon diesel storage tank.

The four 8,250-kW generators would provide electrical power for the FSRU. Each generator engine would operate with either natural gas or diesel as its primary fuel. Under normal conditions, the generator engines would operate with natural gas as the primary fuel and diesel as the pilot fuel (at a natural gas to diesel ratio of approximately 99:1). According to the Applicant, the generator engines would operate on diesel only under the following conditions: (1) during an emergency if both sources of natural gas were lost; (2) for monthly tests of the emergency generator and firefighting water pumps; (3) during emergency training drills; or (4) during commissioning before the first delivery of liquefied natural gas (LNG).

Submerged combustion vaporizers would be used to vaporize LNG to natural gas (see "LNG Regasification Facilities" in Section 2.2.2.3). Submerged combustion vaporizers are heat exchangers that use water baths as the heating medium to vaporize LNG to natural gas within pipes submerged in the water baths. The water baths are maintained at a constant temperature by bubbling hot exhaust gas produced from natural gas burners through the water baths. The cooled exhaust gas is then vented to the atmosphere. The Applicant has proposed to limit the maximum combined heat input rate of the submerged combustion vaporizers to 862.5 MMBtu/hr (equivalent to eight

units operating at approximately 94 percent load). This maximum operational rate would be sustained for no more than six hours. For any 24-hour period, the Applicant has proposed to limit the average combined heat input rate of the submerged combustion vaporizers to 690 MMBtu/hr (equivalent to six units at 100 percent load). An average annual combined heat input rate of 460 MMBtu/hr (equivalent to four units operating at 100 percent load) has also been proposed.

The IGG would generate an inert gas to displace methane from the FSRU LNG storage tanks during required maintenance. The Applicant has estimated that IGG would operate for a maximum of four days per year, but the natural gas burner would operate only for 36 hours per year.

In addition to potential use in emergencies or upset conditions, the emergency generator, emergency fire pump, and freefall lifeboat engine would be operated briefly each month as part of routine maintenance procedures. Emissions from brief operation of the engines for maintenance purposes are also included in the operational emission totals.

As part of the construction permit application to the USEPA, the Applicant prepared an emission control technology analysis to identify methods to reduce air pollutant emissions from FSRU equipment. The Applicant proposes to install selective catalytic reduction (SCR) and catalytic oxidation equipment to reduce NO_x, CO, and ROCs emissions from the 8,250-kW generator engines. SCR includes the injection of NH_3 or urea into the exhaust gas stream so that NO_x, NH_3, and oxygen react on the surface of a catalyst to form nitrogen and water. A byproduct of SCR would be emissions of a small quantity of unreacted NH_3 (NH_3 slip), ammonium sulfate, PM_{10}, and $PM_{2.5}$. Catalytic oxidation equipment would utilize a catalyst material, most likely a precious metal such as platinum, palladium, or rhodium, to promote the oxidation of CO and ROCs to CO_2. Unlike SCR, catalytic oxidation does not require the introduction of additional chemicals for the reaction to proceed.

As outlined in the emission control technology analysis, the Applicant would install low NO_x pre-burner systems on the submerged combustion vaporizers to reduce NO_x emissions and to control ROCs and CO emissions through good combustion practices. The Applicant further proposes that the emergency generator, fire pump, and freefall lifeboat engines would be compliant with USEPA Tier 2 emission standards for off-road engines.

Estimates for the annual potential-to-emit (PTE) of each air pollutant from FSRU equipment are based upon the following assumptions:

- SCR and catalytic oxidation equipment would be installed on the 8,250-kW generators;
- Submerged combustion vaporizers would be fitted with low NO_x pre-burner systems;

- The annual electrical power production rate from all 8,250-kW generators would be restricted to a maximum of 110,903 megawatt-hours while operating on the natural gas/diesel fuel mixture. The total diesel usage in all 8,250-kW generator engines under diesel-only operation would be limited to 48,417 gallons per year (equivalent to 100 hours per year of operation);
- The average annual combined heat input rate of the submerged combustion vaporizers would be limited to 460 MMBtu/hr (equivalent to four units operating at 100 percent load). Total natural gas usage in all submerged combustion vaporizers would be restricted to no more than 4 billion cubic feet per year;
- Annual diesel fuel use in the emergency generator and emergency fire pump engines would be limited to 26,150 gallons and 4,270 gallons, respectively (equivalent to 100 hours per year of operation per unit);
- Annual diesel fuel use in the freefall lifeboat engine would be limited to 230 gallons (equivalent to 52 hours per year of operation); and
- Good combustion practices, i.e., proper equipment operation, routine equipment inspection/maintenance, and engine performance analyses, would be used at all times for all fuel burning equipment.

During normal operations, three types of vessels would be involved with Project activities: LNG carriers, tugboats, and a crew/supply boat.

LNG carriers would berth at the FSRU an average of two to three times per week to transfer LNG. A maximum of 99 LNG carrier arrivals would deliver no more than 13.7 million m^3 of LNG annually. As the size of the LNG carriers would be expected to range between 138,000 and 210,000 m^3, the number of berthings would be expected to range between 65 and 99 per year. The total time for LNG carrier berthing, unloading, and de-berthing would take approximately 16 to 21 hours, with LNG unloading lasting over a period of 14 to 19 hours, depending on the size of the LNG carrier. While berthed at the FSRU, the LNG carrier would continue to operate its engines in order to supply electrical power for the LNG transfer pumps and other miscellaneous vessel processes. The LNG transfer pumps are used to pump the LNG from LNG carrier storage tanks to FSRU storage tanks.

Two Project-dedicated tugboats would assist the LNG carrier in transit to and berthing with the FSRU and would patrol the safety zone during unloading operations. Once a week, one of the tugboats would make a roundtrip to Port Hueneme to get supplies for the FSRU. The tugboats would remain on standby at the FSRU at all other times. In addition, a Project-dedicated crew/supply boat would be used to transport FSRU and LNG carrier crew members to and from shore and would also be present during the berthing and deberthing of every LNG carrier.

To reduce Project emissions, the Applicant would use natural gas as the primary fuel in the engines on the LNG carriers while these vessels are berthed at the FSRU or operating within California Coastal Waters. Diesel would be used simultaneously as a pilot fuel, resulting in a fuel mixture with a natural gas to diesel ratio of approximately

99:1. Boil-off gas generated from the LNG carrier storage tanks would be used as fuel on the LNG carriers. By maintaining a specified amount of LNG in the LNG carrier cargo tanks after transfer operations, the LNG carrier would be able to operate on boil-off gas until it is beyond California Coastal Waters.

A combination of "purpose-built" vessels, i.e., vessels constructed exclusively for the Project and other vessels not dedicated to the Project, would deliver LNG to the FSRU. Contracts with vessel operators would specify that all LNG carriers would be required to be powered exclusively by Wartsila 50DF series dual fuel electric engines or equivalent dual-fuel electric engines. The LNG vessels would be equipped with an array of dual-fuel electric engines of varying sizes to provide power for propulsion as well as auxiliary systems on the vessel.

Diesel would be used to fuel the engines on the tugboats and the crew/supply boat. The diesel engines on these vessels would be fitted with pollution control equipment, including SCR, oxidation catalyst, and particulate filters to reduce emissions. The use of this control equipment would result in emissions comparable to or below levels that would have resulted from the use of natural gas-fueled engines.

Estimates of the air pollutant emissions from Project vessels are based on the following assumptions:

- LNG carriers would operate only with boil-off gas (natural gas) as the primary fuel while operating in California Coastal Waters;
- The number of LNG carrier berthings at the FSRU would be limited to no more than 99 per year;
- The LNG carrier engines would operate at a maximum rating of 6,500 brake-horsepower over the entire duration of LNG transfer to the FSRU;
- The tugboats and the crew/supply boat diesel engines would be fitted with air pollution control technology;
- A tugboat would make an average of 1 roundtrip between the FSRU and Port Hueneme each week (equivalent to 52 roundtrips per year); and
- The crew/supply boat would make an average of approximately 4 roundtrips between the FSRU and Port Hueneme each week (equivalent to 200 roundtrips per year).

Table 4.6-12 provides a summary of annual PTE for regulated air pollutants from FSRU stationary sources, including emissions from the LNG carrier engines used to power the LNG transfer pumps, and updated emissions from the FSRU to reflect the emission limits stipulated in the USEPA's Proposed Authority to Construct for Cabrillo Port (USEPA 2006a). Table 4.6-13 summarizes the estimated annual emissions from vessels associated with normal Project operations, except for emissions associated with LNG transfer pumps. Table 4.6-13a summarizes the estimated total annual emissions from FSRU and Project vessel operations. The methodology and assumptions used to develop these emission estimates is outlined in Appendix G2.

Table 4.6-12 Air Pollutant Potential to Emit from FSRU Equipment

Description	Annual Potential-to-Emit (tons per year)						
	CO	NH_3	NO_x	PM_{10}	$PM_{2.5}$	ROCs	SO_2
8,250-kW generators (natural gas/diesel-pilot fuel)	20.8	6.0	12.2	8.1	8.1	24.5	0.08
8,250-kW generators (diesel only)	0.2	0.05	1.9	0.1	0.1	0.3	0.01
Submerged combustion vaporizers	148.9	-	48.9	3.8	3.8	3.5	0.3
Emergency generator and emergency fire pump engine	1.9	-	3.0	0.1	0.1	0.4	0.003
Freefall lifeboat engine	0.02	-	0.02	0.001	0.001	0.003	0.00002
Diesel fuel storage tank	-	-	-	-	-	0.03	-
Inert gas generator	0.1	-	0.1	0.01	0.01	0.007	0.0008
LNG Carrier (Pumping Only)	6.6		9.4	0.4	0.4	2.7	0.004
Total	**178.5**	**6.1**	**75.5**	**12.6**	**12.6**	**31.4**	**0.4**

Table 4.6-13 Air Pollutant Emissions from Project Vessels – Normal Operations

Location	Vessel Type	Annual Emissions (tons per year)					
		CO	NO_x	PM_{10}	$PM_{2.5}$	ROCs	SO_2
Ventura County waters	Tugboats	0.2	0.2	0.01	0.01	0.1	0.002
	Crew/supply boat	0.06	0.06	0.004	0.004	0.03	0.0005
	Subtotal	**0.3**	**0.3**	**0.01**	**0.01**	**0.1**	**0.002**
Federal waters (≤25 NM of shore)	LNG carrier	14.9	21.1	0.9	0.9	6.1	0.01
	Tugboats	26.2	27.0	1.5	1.5	11.6	0.17
	Crew/supply boat	0.8	0.8	0.05	0.05	0.3	0.005
	Subtotal	**41.9**	**48.9**	**2.5**	**2.5**	**18.0**	**0.2**
Federal waters (>25 NM of shore)[a]	LNG carrier	25.1	35.5	1.6	1.6	10.2	0.01
Total		**67.0**	**84.4**	**4.1**	**4.1**	**28.2**	**0.2**

Note:

[a]Emissions estimated from 25 NM of shore to the defined boundary of California Coastal Waters.

Table 4.6-13a Total Project Air Pollutant Emissions

Description	Annual Emissions (tons per year)						
	CO	NH_3	NO_x	PM_{10}	$PM_{2.5}$	ROCs	SO_2
FSRU[a]	178.5	6.1	75.5	12.6	12.6	31.4	0.4
Vessels[a]	67.0	-	84.4	4.1	4.1	28.2	0.2
Total	**245.5**	**6.1**	**159.9**	**16.7**	**16.7**	**59.8**	**0.6**

Note:
[a]Emissions from LNG carriers due to LNG pumping are accounted for under FSRU.

Regulated Air Pollutant Emissions – FSRU Start-Up Activities

The start-up and commissioning of the FSRU would last for approximately 60 days of equipment operating time. This start-up period would begin when the FSRU is moored to the sea floor and would end with the first LNG delivery. Air pollutant emissions during this start-up period were calculated based on the following assumptions:

- Two 8,250-kW generators would operate with diesel fuel only at 75 percent electrical load (total electrical output of 12.4 MW) for 24 hours per day over the entire 60-day start-up period (equivalent to 1,440 machine-hours or 17,800 megawatt-hours;
- SCR and oxidation catalyst equipment would operate 24 hours per day to control emissions from the 8,250-kW generators;
- Each emergency fire pump engine and emergency generator would operate at 100 percent load for 16 hours;
- The freefall lifeboat engine would operate at 100 percent load for eight hours; and
- The submerged combustion vaporizers would not operate.

The estimated emissions associated with the FSRU start-up are summarized in Table 4.6-14. The calculations and detailed assumptions used to develop these emission estimates are outlined in Appendix G3.

4.6.1.4 Greenhouse Gas Emissions

In addition to regulated air pollutants, the Project would generate emissions of the greenhouse gases CO_2 and methane. The CO_2 emission coefficient for natural gas is 117. Coal (approximately 78 percent carbon) and oil (approximately 85 percent carbon) have higher carbon contents (more pounds of carbon per MMBtu) than natural gas (approximately 75 percent carbon), which leads to greater carbon emissions when combusted (more tons of CO_2 per megawatt hour produced) (EIA 1994). For comparison, the CO_2 emission coefficient for No.2 fuel oil and anthracite coal are 161, and 227 pounds of CO_2 per MMBtu, respectively (EIA 2001).

Table 4.6-14 Air Pollutant Emissions from FSRU Stationary Sources during Start-Up

Description	Annual Potential-to-Emit (tons per year)						
	CO	NH_3	NO_x	PM_{10}	$PM_{2.5}$	ROCs	SO_2
8,250-kW generators (diesel only)	4.2	1.0	41.8	3.1	3.1	5.8	0.1
Emergency generator and emergency fire pump engine	0.3	-	0.5	0.02	0.02	0.1	0.0005
Freefall lifeboat engine	0.003	-	0.003	0.0002	0.0002	0.0005	0.00001
Diesel fuel storage tank	-	-	-	-	-	0.005	-
Support vessels	0.5	-	0.5	0.03	0.03	0.1	0.003
Total	**5.0**	**1.0**	**42.8**	**3.2**	**3.2**	**6.0**	**0.1**

If the proposed Cabrillo Port Project is not approved, SoCalGas may obtain its gas from elsewhere in North America. In this scenario, the combustion would occur anyway, i.e., would be in the baseline scenario. In the absence of the Cabrillo Port Project, it is also highly unlikely that the natural gas would be left in the ground in Western Australia; it would likely be extracted, liquefied, transported, and sold elsewhere. For the proposed Cabrillo Port Project, the additional life cycle emissions that can be attributed specifically to the Project would be only the portion of those emissions that would be generated by transporting the LNG across the Pacific Ocean to the Cabrillo Port facility. If the LNG were imported into a different receiving facility in California, the GHG emissions would be the same as those of the proposed Project.

A substantial amount of CO_2 would be formed as a primary product of combustion of natural gas and diesel. A much smaller amount of methane would be emitted from Project equipment as uncombusted natural gas. A small portion of LNG would be vaporized from LNG carrier or FSRU storage tanks, i.e., boil-off gas. Boil-off gas is essentially natural gas comprised primarily of methane. During normal Project operation, boil-off gas would be used as fuel on LNG carriers and the FSRU. However, direct releases of boil-off gas to the atmosphere would take place only during scheduled maintenance of FSRU LNG storage tanks or an upset condition. During scheduled maintenance of the tanks, an inert gas would be used to purge boil-off gas from the tanks. The Applicant has indicated that the tanks would be purged a maximum of four times per year with approximately 91,000 m^3 of boil-off gas released during each purge.

During normal operations, FSRU stationary sources and Project vessels would generate annual CO_2 and methane emissions of approximately 0.31 and 0.0008 million tons (MMtons) per year, respectively. Since different greenhouse gases have varying global warming impacts, global warming potential factors are used to standardize greenhouse gas emissions into "CO_2 equivalents." CO_2 is assigned a global warming potential factor of 1 and methane is estimated to have a global warming potential factor of 21 (CEC 2006). Thus, the annual greenhouse gas emissions for the Project are estimated at 0.33 MMtons tons per year of CO_2 equivalents. These emissions represent less than

0.08 percent of the 431 MMtons of CO_2-equivalent greenhouse gas emissions produced in California in 2004 (CEC 2006).

FSRU start-up operations would generate an additional 0.010 MMtons of CO_2. Project construction activities would also generate approximately 0.017 MMtons of CO_2 emissions.

Potential increases in the ambient concentrations of these gases are not expected to have any appreciable impact on human health or the local environment. A discussion of CO_2 and methane emissions from the Project, as related to global warming, is provided in Section 4.20, "Cumulative Impacts Analysis." A description of the California Global Warming Solutions Act of 2006 is presented in Section 4.6.2.

4.6.2 Regulatory Setting

Ambient air quality and air pollutant emissions from stationary and mobile sources are managed under a framework of Federal, State, and local rules and regulations. The USEPA is the principal administrator responsible for overseeing enforcement of Federal CAA statues and regulations. The CARB is the primary administrator for State air pollution and air quality management rules and regulations. The VCAPCD is the administrator of Ventura County air pollution rules, and the South Coast Air Quality Management District (SCAQMD) is the administrator of air pollution rules for the South Coast Air Basin, which includes the non-desert portion of Los Angeles County.

Project-related activities that would occur within Ventura County or the South Coast Air Basin would be subject to all pertinent Federal and State regulations, as well to the applicable VCAPCD or SCAQMD air pollution rules. The administration of air quality regulations and permits for Project activities in Ventura County and Los Angeles County would be under the jurisdiction of the VCAPCD and the SCAQMD, respectively.

Pursuant to the Deepwater Port Act, the USEPA has jurisdiction to administer air quality regulations and issue required air quality permits for applicable Project activities that occur outside of the seaward boundaries of California counties, including operation of the FSRU. The Deepwater Port Act deems the law of the "nearest adjacent coastal state" to be Federal law and requires it to be applied to the deepwater port "to the extent applicable and not inconsistent with any" Federal law or regulation (33 U.S.C. § 1518(b)). Thus, in addition to enforcing the CAA, the USEPA is required to apply the applicable law of California with respect to air pollution control when issuing air permits for deepwater ports. California has created local air pollution districts and, pursuant to California Health & Safety Code, Division 26, Part 3, each district establishes and enforces local air pollution control regulations to attain and maintain all State and Federal ambient air quality standards. To apply the applicable law of California with respect to air pollution therefore requires determination of the appropriate air pollution control district. For purposes of the Project, the USEPA has determined that the VCAPCD portion of the California State Implementation Plan (SIP) contains the applicable air permitting regulations.

The FSRU would be located 12.01 NM (13.83 miles or 22.25 km) offshore Ventura County. In May 2006, USEPA Region 9 announced that it was accepting public comment on a proposed CAA permit (Authority to Construct) that would grant conditional approval to the Applicant to construct the FSRU. In order to clarify the regulatory status of the FSRU, the USEPA stated in its May 2006 permit-supporting documentation, "EPA found it necessary to determine – after determining that the VCAPCD portion of the California SIP contains the applicable air permitting regulations – whether the attainment area or nonattainment area requirements of the VCAPCD should be applied to the FSRU. EPA considered factors such as the location of the FSRU in relation to the Channel Islands and the mainland of Ventura County, the current uses of the Channel Islands, and the amount of emissions and the air quality impact to be expected from the stationary source. As a result of this consideration, EPA proposes to permit Cabrillo Port in the same manner as sources in the federal attainment area would be permitted (i.e., in the same manner as sources on the Channel Islands)" (USEPA 2006b).

In this statement, the Channel Islands are in the jurisdiction of Ventura County. The USEPA further concludes, "Because EPA is permitting the FSRU in the same manner as sources in the federal attainment area, the emission units onboard the FSRU are not subject to the provisions of Rule 26.2" (USEPA 2006b). VCAPCD Rule 26 outlines new source review (NSR) requirements.

In September 2005, the VCAPCD staff concurred with the USEPA's interpretation of VCAPCD Rule 26 that exempted the Project from emission offset and best available control technology (BACT) requirements. However, the VCAPCD has since changed its position on the applicability of VCAPCD Rule 26 (primarily on the exemptions listed under VCAPCD Rule 26.3) and now disagrees with the USEPA's interpretation of Rule 26.

In November 2006, the VCAPCD issued a letter to USEPA Region 9 that objects to the USEPA's Statement of Basis for the Proposed CAA Permit as it relates to NSR. The letter concludes, "…based on the information and analysis above, the APCD is now of the opinion that Rule 26.2 (the requirements including Best Available Control Technology and emission offsets) applies to the proposed Cabrillo Port project…" and "…on November 14, 2006, the Ventura County Air Pollution Control Board went on record as strongly supporting the current APCD staff interpretation that Rule 26.2 applies and Rule 26.3 does not apply to the Cabrillo Port project…" (Villegas 2006).

Although the USEPA has proposed to issue a preconstruction permit, the USEPA has not yet made a final permit decision. Upon making a decision on the permit, the USEPA will make a final determination regarding the applicability of Rule 26.2. If the USEPA were to change or reverse this determination, additional air permitting requirements, including offsets, could apply. However, the lead agencies have confirmed that regardless of whether Rule 26.2 applies, all Project emissions have been properly quantified and disclosed in this document. Additionally, as has been stated throughout the document, any U.S. Maritime Administration (MARAD) license issued would contain

conditions requiring compliance with all applicable Federal, State, and local laws, which could include VCAPCD Rule 26.2, if the USEPA determines that it is applicable.

A summary of major Federal, State, and local rules and regulations related to air quality and the potential applicability of each rule/regulation to the Project is presented in Table 4.6-15.

Table 4.6-15 Major Laws, Regulatory Requirements, and Plans for Air Quality

Law/Regulation/Plan/ Agency	Key Elements and Thresholds; Applicable Permits
Federal	
National Primary and Secondary Ambient Air Quality Standards 40 CFR Part 50 - *USEPA*	• Primary and secondary ambient air quality standards designated to protect public health and welfare. • *Project Applicability:* - Air quality impacts caused by emissions related to Project activities would be compared with NAAQS.
Determining Conformity of General Federal Actions to State or Federal Implementation Plans 40 CFR Part 51, Subpart W and 40 CFR Part 93, Subpart B - *MARAD, USCG*	• This regulation is cited by reference in VCAPCD Rule 220 and SCAQMD Rule 1901. • Federal agencies must determine if a Federal action conforms to the applicable State Implementation Plan. • A General Conformity Rule determination is required for each pollutant where the total of direct and indirect emissions in a nonattainment or maintenance area would equal or exceed specified thresholds or are deemed to be regionally significant. • *Project Applicability (FSRU operations):* - The USEPA is regulating the FSRU in the same manner as sources as located on the Channel Islands. Federal actions in the Channel Islands (in Ventura County) are not subject to this regulation because the region is not classified as a Federal nonattainment or maintenance area for any criteria pollutant. Thus, the proposed issuance of a permit under the Deepwater Port Act and any emissions directly related to FSRU operations would not be subject to this regulation. • *Project Applicability (activities in Ventura and Los Angeles counties):* - Mainland Ventura County and its associated waters are classified as a Federal ozone nonattainment area. Los Angeles County is classified as a Federal nonattainment for a number of criteria pollutants. Project construction activities in these counties would require a permit from at least one Federal agency. However, anticipated construction emissions in Ventura and Los Angeles counties are less than the General Conformity applicability thresholds (see Appendix G4 of this document).
Prevention of Significant Deterioration (PSD) 40 CFR § 52.21 - *USEPA*	• Requires that new major stationary sources and major modifications be reviewed prior to construction to ensure compliance with NAAQS, PSD air quality increments, and BACT. • For new major stationary sources and major modifications; applies only to regulated NSR pollutants that are emitted in significant amounts. • A source is defined as a “major stationary source” if: - It is classified in one of the 28 named source categories and it has a PTE equal to or greater than 100 tons per year of any pollutant regulated under the CAA; or

Table 4.6-15 Major Laws, Regulatory Requirements, and Plans for Air Quality

Law/Regulation/Plan/ Agency	Key Elements and Thresholds; Applicable Permits
	- It is any other stationary source that has a PTE equal to or greater than 250 tons per year of any pollutant regulated under the CAA. • *Project Applicability:* - The statement of basis for the USEPA's proposed air permit indicates that the FSRU is not subject to PSD regulations because the overall function of the FSRU does not meet the definition of one of the 28 named source categories, and the PTE of air pollutants emitted from FSRU stationary sources is less than 250 tons per year.
State	
Sulfur Content of Diesel Fuel 13 CCR 2281 - *California Air Resources Board (CARB)*	• By September 2006, the sulfur content of vehicular diesel fuel sold or supplied in California must not exceed 15 parts per million by weight. • As stipulated in 13 CCR 2299 and 17 CCR 93114, non-vehicular diesel fuel is subject to the sulfur limits specified in this regulation. • *Project Applicability:* • Diesel supplied in California for Project vehicles, vessels, and equipment would be subject to this regulation and, therefore, must have a sulfur content less than or equal to 15 parts per million by weight.
Specifications for Compressed Natural Gas 13 CCR 2292.5 - *CARB*	• Contains specifications for compressed natural gas used as an alternative motor vehicle fuel. • Standards listed for content of methane, ethane, higher chained hydrocarbons, sulfur, and other compounds that can be present in compressed natural gas. • *Project Applicability:* - The Project would not be directly subject to this regulation. However, any compressed natural gas created from natural gas from the Project would be required to conform to all requirements of this regulation.
Standards for Non-vehicular Diesel Fuel Used in Diesel-Electric Intrastate Locomotives and Harborcraft 13 CCR 2299 - *CARB*	• By January 2007, non-vehicular diesel fuel sold or supplied in California for locomotives or harborcraft will be subject to all of the requirements of 13 CCR 2281 (sulfur content), 13 CCR 2282 (aromatic hydrocarbons content) and 13 CCR 2284 (lubricity) applicable to vehicular diesel fuel and shall be treated under those sections as if it were vehicular diesel fuel. • *Project Applicability:* - Diesel supplied in California for Project vessels would be subject to this regulation and would be required to meet the sulfur content limits stipulated in 13 CCR 2281.
Ambient Air Quality Standards 17 CCR 70100-70201 - *CARB*	• Ambient air quality standards designated in California to protect public health and welfare. • *Project Applicability:* • Air quality impacts caused by emissions related to Project activities would be compared with California ambient air quality standards.
Airborne Toxic Control Measure to Reduce Particulate Emissions from Diesel-Fueled Engines - Standards for Non-vehicular Diesel Fuel	• California non-vehicular diesel fuel is subject to all of the requirements of 13 CCR 2281 (sulfur content), 13 CCR 2282 (aromatic hydrocarbons content), and 13 CCR 2284 (lubricity) applicable to vehicular diesel fuel and shall be treated under those sections as if it were vehicular diesel fuel, provided that these requirements do not apply to diesel fuel offered, sold, or supplied solely for use in locomotives or marine vessels. • *Project Applicability:*

Table 4.6-15 Major Laws, Regulatory Requirements, and Plans for Air Quality

Law/Regulation/Plan/ Agency	Key Elements and Thresholds; Applicable Permits
17 CCR 93114 - *CARB*	- Diesel supplied in California for Project nonroad equipment and stationary sources would be subject to this regulation and must meet the sulfur content limits stipulated in 13 CCR 2281.
Standards for Gas Service in the State of California General Order 58-A - *California Public Utilities Commission (CPUC)*	• Applies to any public utility that supplies natural gas within California where gas service is subject to the jurisdiction of the CPUC. • Requires each utility to establish and maintain a standard heating value for its product. • Contains limits for the content of hydrogen sulfide (H_2S) and total sulfur in natural gas. • *Project Applicability:* - The quality of natural gas distributed in Southern California from the Project would be subject to a tariff agreement negotiated between the Applicant and SoCalGas. Tariff agreements, and the pipeline-quality gas specifications contained within, must be approved by the CPUC to ensure public health and safety for end-users and protection of the environment (particularly air quality).
CPUC. 2006. Decision 06-09-039, Phase 2 Order Addressing Infrastructure Adequacy and Slack Capacity, Interconnection and Operational Balancing Agreements, an Infrastructure Working Group, Natural Gas Supply and Infrastructure Adequacy for Electric Generators, Natural Gas Quality, and Other Matters. - *CPUC*	• Assesses the sufficiency of natural gas supplies and infrastructure in California. The Commission issued a Phase I decision in September 2004, specifically resolving some matters related to the anticipated introduction of gas supplies derived through liquefied natural gas (LNG). • Adopts rule changes to SoCalGas tariffs regarding gas quality. SoCalGas Rule 30 is revised to reflect: - Minimum and maximum Wobbe Numbers of 1,279 and 1,385, respectively; - Minimum and maximum heating value of 990 British thermal units per dry standard cubic foot (Btu/dscf) and 1,150 Btu/dscf, respectively; and - Changes to H_2S, mercaptan sulfur, total sulfur, water vapor, hydrocarbon dew point, liquids, merchantability, landfill gas, and biogas specifications. • *Project Applicability* - The natural gas supplied through the Project would be required to meet the requirements of Rule 30. The quality of natural gas distributed in Southern California from the Project would be subject to a tariff agreement negotiated between the Applicant and SoCalGas. Tariff agreements, and the pipeline-quality gas specifications contained within, must be approved by the CPUC to ensure public health and safety for end-users and protection of the environment, particularly air quality.
California Coastal Act § 30253 (3) - *California Coastal Commission (CCC)*	• Requires that new development maintain consistency with the requirements of the applicable air pollution control district or the CARB. • *Project Applicability:* - The Project would be required to comply with all applicable Federal, State, and local air quality regulations.
California Global Warming Solutions Act of 2006 - *CARB*	• In September 2006, California Governor Arnold Schwarzenegger signed Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006, which became law in January 2007. AB 32 requires CARB to: - Establish a statewide greenhouse gas emissions cap for 2020, based on 1990 emissions; - Adopt mandatory reporting rules for significant sources of greenhouse gases;

Table 4.6-15 Major Laws, Regulatory Requirements, and Plans for Air Quality

Law/Regulation/Plan/ Agency	Key Elements and Thresholds; Applicable Permits
	- Adopt a plan indicating how emission reductions will be achieved from significant greenhouse gas sources via regulations, market mechanisms and other actions; - Adopt regulations to achieve the maximum technologically feasible and cost-effective reductions in greenhouse gases, including provisions for using both market mechanisms and alternative compliance mechanisms; and - Convene an Environmental Justice Advisory Committee and an Economic and Technology Advancement Advisory Committee to advise CARB.
Local	
New Source Review (NSR) VCAPCD Rule 26 - *USEPA, VCAPCD*	• Rule 26.2 requires new, replacement, modified, or relocated stationary sources in Ventura County that emit PM_{10}, NO_x, ROCs, or SO_2 to be equipped with BACT for these pollutants. • Rule 26.2 requires emission offsets for sources where the PTE of these pollutants is greater than or equal to the specified thresholds. • Sources located on San Nicolas and Anacapa Islands are exempt from Rule 26.2. • *Project Applicability:* - Based on an analysis of the Deepwater Port Act and VCAPCD rules, the USEPA made a preliminary determination that the BACT and offset requirements of Rule 26.2 do not apply to the FSRU and that emission offsets are not required for Project sources constructed in the area where the FSRU is proposed to be sited (USEPA 2006b). However, the Project is not exempt from Rule 26 in its entirety and thus is subject to applicable portions of Rule 26.1 through Rule 26.12 (see also previous discussion of VCAPCD action of November 2006).
Permits Required VCAPCD Rule 10 - *USEPA, VCAPCD*	• An Authority to Construct shall be required for any new, modified, relocated, or replacement emissions unit at a stationary source. • A person shall not operate, use, or offer for use any emissions unit at a stationary source without first obtaining a Permit to Operate. • *Project Applicability:* - The USEPA has proposed an Authority to Construct for the FSRU under this rule.
CAA Title V Permits VCAPCD Rule 33 - *USEPA, VCAPCD*	• Rule complies with CAA Title V operating permit program requirements. • Title V permits are required for stationary sources defined as “Major Sources” in 40 CFR Part 70 (and referenced in VCAPCD Rule 33) • Permit specifies all emission standards, recordkeeping and testing requirements, and compliance assurance measures applicable to the emission units of the stationary source. • *Project Applicability:* - The FSRU would be required to obtain a Title V permit because the annual PTE of CO would exceed the major source threshold of 100 tons per year.
Nuisance VCAPCD Rule 51 - *USEPA, VCAPCD*	• Forbids discharge of air contaminants or other material which cause injury, detriment, nuisance or annoyance to the public or which endangers the comfort, repose, health, or safety of the public or which cause damage to business or property. • *Project Applicability:* - This rule is applicable to the Project.

Table 4.6-15 Major Laws, Regulatory Requirements, and Plans for Air Quality

Law/Regulation/Plan/ Agency	Key Elements and Thresholds; Applicable Permits
Fugitive Dust SCAQMD Rule 403 - *SCAQMD*	• Reduces the amount of particulate matter entrained in the ambient air as a result of anthropogenic (manmade) fugitive dust sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. • Applies to any activity or man-made condition capable of generating fugitive dust. • *Project Applicability:* - Project construction activities within Los Angeles County would be required to comply with all applicable provisions of this rule.

Under General Conformity Rule requirements, Federal agencies must determine if a Federal action conforms to the applicable SIP. A General Conformity Rule determination is required for each pollutant where the total of direct and indirect emissions in a nonattainment or maintenance area would equal or exceed specified thresholds or are deemed to be regionally significant.

In March 2006, MARAD and the U.S. Coast Guard (USCG) announced the availability of and solicited public input on a Draft General Conformity Determination for the Project. The Draft General Conformity Determination concluded that NO_x emissions from Project construction activities in Los Angeles County were above de minimis thresholds and thus subject to the General Conformity Rule. All other Project-related emissions were determined not to be subject to the General Conformity Rule in both Ventura and Los Angeles Counties because emissions were less than de minimis thresholds.

Subsequent to the issuance of the Draft General Conformity Determination, the Applicant made a commitment to the MARAD/USCG that all onshore pipeline construction equipment would, to the extent possible, utilize engines compliant with USEPA Tier 2, 3, or 4 nonroad engine standards with Tier 2 being the minimum standard for any engine. The USCG reanalyzed Project emissions to assess the potential emission reductions associated with the stated commitment and to reassess the applicability of the General Conformity Rule. The revised General Conformity analysis revealed that all applicable Project emissions would be less than de minimis thresholds in both Ventura and Los Angeles Counties and, therefore, not subject to the General Conformity Rule. Based on this conclusion, MARAD and the USCG will not finalize the Draft General Conformity Determination. A copy of the revised General Conformity analysis is provided in Appendix G4.

Emissions associated with the FSRU and Project vessels would not be subject to the General Conformity Rule since the Channel Islands and Federal waters are not designated as a Federal nonattainment or maintenance area.

The quality of natural gas distributed in Southern California from the Project would be subject to a tariff agreement negotiated between the Applicant and SoCalGas. Tariff agreements, and the pipeline-quality gas specifications contained within, must be approved by the CPUC to ensure public health and safety for end-users and protection

of the environment (particularly air quality). Tariff agreements would be subject to renegotiation and change over the life of the Project if market conditions change or if regulatory requirements are modified. SoCalGas' existing tariff agreements with other suppliers require compliance with Rule 30, "Transportation of Customer-Owned Gas" (SoCalGas 1997). Rule 30 includes the following specific requirements that must be met for any natural gas distributed in Southern California, regardless of whether the gas is produced in California or imported from other U.S. or international gas reservoirs:

- Concentration limits for a number of substances, including H_2S, mercaptan sulfur, total sulfur, moisture or water content, CO_2, oxygen, inerts, and hydrocarbons;
- Specific acceptance criteria for gross heating values;
- Specific acceptance criteria to ensure interchangeability of natural gas from different sources, including the American Gas Association's Wobbe Number (also referred to as Wobbe Index), lifting index, flashback index, and yellow tip index; and
- A prohibition on acceptance of natural gas shipments that "contain hazardous substances (including but not limited to toxic and/or carcinogenic substances and/or reproductive toxins) concentrations which would prevent or restrict the normal marketing of the gas, be injurious to pipeline facilities, or which would present a health and/or safety hazard to Utility employees and/or the general public."

In September 2006, the CPUC ordered SoCalGas to revise Rule 30 to incorporate the following specifications regarding natural gas quality standards:

- Minimum and maximum Wobbe Number of 1,279 and 1,385, respectively;
- Minimum and maximum heating value of 990 British thermal units per dry standard cubic foot (Btu/dscf) and 1,150 Btu/dscf, respectively; and
- Changes to H_2S, mercaptan sulfur, total sulfur, water vapor, hydrocarbon dew point, liquids, merchantability, landfill gas, and biogas specification.

This decision is the culmination of a proceeding initiated by the CPUC in January 2004 to assess the sufficiency of natural gas supplies and infrastructure in California and specifically resolving some matters related to the anticipated introduction of gas supplies derived through LNG (CPUC 2006).

Natural gas delivered to and used in California is also regulated through CPUC General Order 58-A, Standards for Gas Service in the State of California, which sets standards for the heating value and purity of natural gas. The heating value standard requires uniform quality of the gas supplied but does not specify an average, minimum, or maximum heating value. The Applicant would be required to meet these standards and any other applicable gas standards in effect during Project operations.

Natural gas is a gaseous mixture primarily composed of methane, with small amounts of more complex hydrocarbons such as ethane, propane, butane, and pentane. The

heating value of natural gas typically fluctuates, depending on its hydrocarbon composition. Higher concentrations of more complex hydrocarbons usually result in higher heating values. The Wobbe Number is found by dividing the higher heating value of natural gas by the square root of its specific gravity with respect to air. Combustion of natural gas with elevated higher heating values and Wobbe Numbers results in increased combustion temperature and, possibly, increased NO_x emissions. Combustion of natural gas with uncharacteristically higher heating values could increase stationary source NO_x emissions by greater than 20 percent according to testing conducted by the SCAQMD on two pieces of non-residential natural gas fired equipment (SCAQMD 2003). Historically, natural gas in the South Coast Air Basin has an average heating value of about 1,020 Btu/dscf and a Wobbe Number of about 1,332 (SCAQMD 2005).

Several factors relating to the natural gas to be delivered by the Applicant are not known at this time: (1) the precise heat content of the natural gas to be imported, other than it will meet the then existing standards, as described above, for such imports; (2) the sector of SoCalGas's market to which the gas will be diverted, e.g., there is no known, dedicated end user or designated sector for the supply[2]; (3) the character of the natural gas with which the gas received from the Applicant may be blended within the SoCalGas distribution system and the resultant heat content of such blend; and (4) whether the gas will be consumed within the South Coast Air Basin. While the potential exists for changes in NO_x emissions due to the burning of natural gas with higher heating values than that acceptable to the SCAQMD, i.e., 1,360 on the Wobbe Index, it would be speculative, based on the above factors, to determine that such would be the case and to subsequently attempt to quantify any related changes in emission levels within the South Coast Air Basin.

4.6.3 Significance Criteria

For the purposes of this document, impacts on air quality are considered significant if the Project:

- Results in a cumulatively considerable net increase of any criteria pollutant for which the region is in nonattainment under an applicable Federal or State ambient air quality standard, including releasing emissions that exceed quantitative thresholds for ozone precursors (a summary of significance thresholds established by the VCAPCD and the SCAQMD is presented in Table 4.6-16);
- Violates any air quality standard or contributes substantially to an existing or projected air quality violation;
- Exposes sensitive receptors to substantial pollutant concentrations;

[2] BHPB has stated that 18 entities have executed letters of interest in the possible purchase of natural gas when it becomes available from Cabrillo Port. These prospective customers represent a range of natural gas purchasers including utilities, electricity generators, cogenerators, manufacturers, and trade groups.

- Creates objectionable odors affecting a substantial number of people; or
- Conflicts with or obstructs implementation of an applicable Federal, State, or local air quality plan.

Table 4.6-16 Significance Thresholds for Emissions in Ventura County and Los Angeles County

Pollutant	Ventura County[a]		Los Angeles County[b]	
	Significant Thresholds for Operational Emissions	Mitigation Thresholds for Construction Emissions	Significant Thresholds for Daily Construction Emissions	Significant Thresholds for Quarterly (3-Month) Construction Emissions
CO	n/a	n/a	550 lbs/day	24.75 tons/quarter
Lead[c]	n/a	n/a	3 lbs/day	n/a
NO_x	25 lbs/day	25 lbs/day	100 lbs/day	2.5 tons/quarter
PM_{10}	n/a	n/a	150 lbs/day	6.75 tons/quarter
ROC	25 lbs/day	25 lbs/day	75 lbs/day	2.5 tons/quarter
SO_2[c]	n/a	n/a	150 lbs/day	6.75 tons/quarter

Sources: VCAPCD 2003; SCAQMD 1993.

Key: n/a = not applicable.

Notes:

[a]All parts of Ventura County outside of Ojai Planning Area.

[b]Parts of Los Angeles County within the South Coast Air Basin.

[c]Pollutant is designated as attainment in the South Coast Air Basin.

4.6.4 Impacts and Mitigation Measures

Applicant-proposed measures (AM) and agency-recommended mitigation measures (MM) are defined in Section 4.1.5, "Applicant Measures and Mitigation Measures."

Impact AIR-1: Net Emission Increases of Criteria Pollutants from Construction Activities in Designated Nonattainment Areas

Project construction activities in Ventura and Los Angeles Counties would generate emissions that exceed quantitative thresholds for ozone precursors (NO_x and ROCs) and CO (CEQA Class I; NEPA major adverse, short-term).

Ventura County (excluding the Channel Islands) and Los Angeles County within the South Coast Air Basin are designated as Federal and State ozone nonattainment areas. Project construction activities in these counties would generate emissions of ozone precursors (NO_x and ROCs) at levels that would exceed VCAPCD mitigation thresholds and SCAQMD significance thresholds (see Table 4.6-17).

Table 4.6-17 Comparison of CO, NO_x, and ROC Construction Emissions with Significance Thresholds

County	Emission Source/Threshold	Daily Emissions (pounds/day)			Quarterly Emissions (tons/quarter)		
		CO	NO_x	ROCs	CO	NO_x	ROCs
Ventura[a]	Offshore pipeline installation	n/a	5,726	830	n/a	n/a	n/a
	Shore crossing construction	n/a	1,140	191	n/a	n/a	n/a
	Worker commuting	n/a	7	4	n/a	n/a	n/a
	Subtotal[b]	n/a	6,873	1,025	n/a	n/a	n/a
	Onshore pipeline installation						
	Trenching	n/a	193	43	n/a	n/a	n/a
	Pipelaying	n/a	187	60	n/a	n/a	n/a
	Boring	n/a	260	53	n/a	n/a	n/a
	Worker commuting	n/a	4	2	n/a	n/a	n/a
	Subtotal	n/a	644	158	n/a	n/a	n/a
	VCAPCD threshold for mitigation	***n/a***	***25***	***25***	***n/a***	***n/a***	***n/a***
Los Angeles	Onshore pipeline installation						
	Trenching	179	193	43	2.7	2.9	0.65
	Pipelaying	979	187	60	12.6	2.3	0.75
	HDD	347	616	125	5.2	9.2	1.9
	Worker commuting	51	3	2	3.1	0.2	0.1
	Subtotal	1,556	999	230	23.6	14.6	3.4
	SCAQMD significance threshold	***550***	***100***	***75***	***24.75***	***2.5***	***2.5***

Sources: VCAPCD 2003; SCAQMD 1993.

Key: n/a = not applicable.

Notes:

[a]Onshore pipeline installation scheduled to occur prior to offshore pipeline installation and shore crossing construction.

[b]Offshore pipeline installation and shore crossing construction may occur concurrently in Ventura County.

Los Angeles County within the South Coast Air Basin is designated as a CO nonattainment area. Project-related construction activities in Los Angeles County would generate CO emissions that exceed SCAQMD significance thresholds (see Table 4.6-17). There are no construction mitigation thresholds for CO in Ventura County because the County is in compliance with CO ambient air quality standards.

A dispersion modeling analysis was performed to predict ambient impacts due to criteria pollutant emissions from offshore and onshore construction activities. Due to the temporary nature of construction, the analysis only assessed short-term impacts. The analysis indicated that emissions from onshore pipelaying activities would contribute to exceedences of NAAQS and State Ambient Air Quality Standards for CO. These exceedences were predicted at locations located within 80 feet (25 meters) of the pipelay construction activity corridor and are attributed primarily to gasoline-fueled construction equipment. The analysis also indicates that NO_x emissions generated from shore crossing construction would contribute to exceedences of State Ambient Air Quality Standard for NO_2. Maximum ambient CO and NO_2 impacts predicted for all other construction activities were less than applicable NAAQS and State Ambient Air

Quality Standard. However, the NO_2 impacts predicted for onshore pipelay and offshore pipelay construction were less than 10 percent below the State Ambient Air Quality Standards. Appendix G5 summarizes the analysis.

Since NO_x and ROCs emissions in Ventura County and NO_x, ROCs, and CO emissions in Los Angeles County exceed local significance thresholds, these Project-related construction emissions would be classified as a Class I impact.

To reduce emissions from construction equipment, the Applicant has incorporated the following measures into the Project:

AM AIR-1a. **USEPA Nonroad Engine Standards.** At a minimum, all onshore construction equipment would utilize engines compliant with USEPA Tier 2 nonroad engine standards. To the extent possible, onshore equipment would utilize engines compliant with USEPA Tier 3 or 4 nonroad engine standards.

AM AIR-1b. **Offshore Construction Equipment Standards.** All vessels (and associated offshore equipment) used during shore crossing construction, offshore pipeline installation, and mooring/FSRU installation, would utilize only engines that emit CO, PM, NO_x, and ROC at rates less than or equal to USEPA Tier 1 nonroad engine standards (as outlined in 40 CFR 89.112, Table 1).

AM AIR-1c. **Ultra Low Sulfur Diesel.** All Project operational vessels (including LNG carrier, tugs, and crew boat), FSRU equipment, and construction vessels and equipment would be fueled with ultra low sulfur diesel (less than 15 parts per million sulfur). This is consistent with California regulations (starting January 2007) that require that the sulfur content of all vehicular diesel fuel and non-vehicular diesel fuel supplied in California (including fuel for locomotives and harborcraft) not exceed 15 parts per million by weight. As it is anticipated that some of the operational and construction vessels/equipment would be transported from outside of California, this measure applies to vessels regardless of place of origin.

<u>Mitigation Measures for Impact AIR-1: Net Emission Increases of Criteria Pollutants from Construction Activities in Designated Nonattainment Areas</u>

MM AIR-1d. **Gasoline-Fueled Equipment.** The Applicant or its designated representative shall use only gasoline-fueled equipment that meets the exhaust emission standards for CO and NO_x (as listed for engine displacements greater than 1.0 liter) outlined in 13 CCR § 2433: Exhaust Emission Standards and Test Procedures – Off-Road Large Spark-Ignition Engines.

MM AIR-1e. **USEPA Tier 3 Nonroad Engine Standards.** All onshore construction equipment with a rating between 100 and 750 hp would be required to utilize engines compliant with USEPA Tier 3 nonroad engine standards.

MM AIR-1f. **Construction Emissions Reduction Plan.** The Applicant shall prepare a Construction Emissions Reduction Plan to be incorporated into all contracts and contract specifications for construction work. This plan shall specify all Applicant measures and mitigation measures related to construction equipment emission standards/controls as contractual requirements. The plan shall also outline additional specific measures, as contractual requirements, to reduce or eliminate potential impacts associated with construction-related emissions of criteria air pollutants and toxic air contaminants. At a minimum, the plan shall include the following additional specific measures:

- As feasible, reduce emissions of particulate matter and other pollutants by using alternative clean fuel technology such as electric, hydrogen fuel cells, and propane-powered equipment or compressed natural gas-powered equipment with oxidation catalysts instead of gasoline- or diesel-powered engines.
- Ensure that all construction equipment is properly tuned and maintained and shut off when not in direct use;
- Prohibit engine tampering to increase horsepower;
- Locate engines, motors, and equipment as far as possible from residential areas and at least 300 feet (91 m) from sensitive receptors, such as schools, daycare centers, and hospitals (Note: the proposed pipeline routes would not pass within 300 feet [91 m] of any sensitive receptor locations);
- Provide carpool shuttles and vans to transport construction workers to and from construction sites, thus eliminating some private vehicle trips;
- Arrange for food catering trucks to visit each Project site twice a day;
- Reduce construction-related trips of workers and equipment, including trucks; and
- Require that on-road vehicles be less than 10 years old.

Prior to finalization of the plan, the Applicant shall also consult with the VCAPCD and the SCAQMD to identify other potential control measures not specified above. The Applicant or its designated representative shall submit this plan and related construction

contract specifications to the California States Land Commission (CSLC), USEPA, and, to the extent applicable under local rules and regulations, the VCAPCD and the SCAQMD, prior to construction activities.

MM AIR-1g. Construction Equipment Documentation. The Applicant or its designated representative shall prepare and maintain documentation that demonstrates implementation of the Applicant's proposed emission reduction measures and required mitigation measures. The following documents and/or files shall be submitted to the CSLC, USEPA, and, to the extent applicable under local rules and regulations, the VCAPCD and the SCAQMD:

- Inventory of all equipment and vessels used during each onshore and offshore construction activity. At a minimum, this inventory shall include an equipment description, equipment identification, identification of type of engine(s), and engine emission data; and
- Documentation certifying that the actual emission rates for the engine(s) of each equipment and vessel used during construction comply with mitigation measures and applicant measures as required. This documentation shall include USEPA or CARB certification of engine emissions, source testing results for specific engines, or an equivalent means of certifying emission rates of NO_x, CO, ROC, and PM_{10} from this equipment.

The use of equipment compliant with more stringent emission standards and implementation of the Construction Emissions Reduction Plan would reduce the emissions of NO_x, ROCs, and CO during onshore construction activities. Table 4.6-17a summarizes the estimated reduced emissions from construction activities due to implementation of mitigation measures. Appendix G1 outlines the methodology used to develop these emission estimates. Potential CO, NO_x, and ROC emission reductions identified in other measures associated with the Construction Emissions Reduction Plan have not been quantified because the feasibility of some of these measures cannot be determined at this time.

Table 4.6-17a Comparison of Mitigated CO, NO_x, and ROC Construction Emissions with Significance Thresholds

County	Emission Source/Threshold	Daily Emissions (pounds/day)			Quarterly Emissions (tons/quarter)		
		CO	NO_x	ROCs	CO	NO_x	ROCs
Ventura[a]	Offshore pipeline installation	n/a	5,726	829	n/a	n/a	n/a
	Shore crossing construction	n/a	928	153	n/a	n/a	n/a
	Worker commuting	n/a	7	4	n/a	n/a	n/a
	Subtotal[b]	n/a	6,661	986	n/a	n/a	n/a

Table 4.6-17a Comparison of Mitigated CO, NO_x, and ROC Construction Emissions with Significance Thresholds

County	Emission Source/Threshold	Daily Emissions (pounds/day)			Quarterly Emissions (tons/quarter)		
		CO	NO_x	ROCs	CO	NO_x	ROCs
	Onshore pipeline installation						
	Trenching	n/a	159	31	n/a	n/a	n/a
	Pipelaying	n/a	139	34	n/a	n/a	n/a
	Boring	n/a	247	48	n/a	n/a	n/a
	Worker commuting	n/a	4	2	n/a	n/a	n/a
	Subtotal	n/a	549	115	n/a	n/a	n/a
	VCAPCD threshold for mitigation	***n/a***	***25***	***25***	***n/a***	***n/a***	***n/a***
Los Angeles	Onshore pipeline installation						
	Trenching	128	159	31	1.9	2.4	0.45
	Pipelaying	365	139	34	4.6	1.8	0.45
	HDD	347	419	39	5.2	6.3	0.9
	Worker commuting	51	3	2	3.1	0.2	0.1
	Subtotal	891	720	126	14.8	10.7	1.9
	SCAQMD significance threshold	***550***	***100***	***75***	***24.75***	***2.5***	***2.5***

Sources: VCAPCD 2003; SCAQMD 1993.

Key: n/a = not applicable.

Notes:

[a]Onshore pipeline installation scheduled to occur prior to offshore pipeline installation and shore crossing construction.

[b]Offshore pipeline installation and shore crossing construction may occur concurrently in Ventura County.

The mitigation measures for Impact AIR-1 would reduce CO and NO_2 emissions, and the dispersion modeling analysis indicates the maximum ambient CO and NO_2 impacts caused by emissions from onshore construction activities would be less than applicable NAAQS and State Air Quality Standards. The analysis is summarized in Appendix G5.

However, since Project-related emissions would not reduce the daily level of NO_x, ROCs, and CO emissions from construction activities to less than the applicable VCAPCD and SCAQMD significance thresholds, this impact would remain Class I.

Impact AIR-2: Violations of Ambient Air Quality Standards Caused by Particulate Emissions from Onshore Construction Activities

Onshore Project construction activities would generate PM_{10} and $PM_{2.5}$ emissions that could cause or contribute to existing or projected violations of NAAQS and/or State Ambient Air Quality Standards (CEQA Class I; NEPA major adverse, short-term).

Los Angeles County within the South Coast Air Basin is designated as a State and Federal nonattainment area for PM_{10} and $PM_{2.5}$. Ventura County is designated as a

State nonattainment area for PM_{10} and $PM_{2.5}$. During onshore construction activities, PM_{10} and $PM_{2.5}$ emissions would be produced from internal combustion engines used in vehicles and equipment and fugitive dust generated by the operation of trucks and earth moving equipment. The PM_{10} emissions from onshore construction in Los Angeles County would be greater than SCAQMD significance thresholds (see Table 4.6-18). The SCAQMD has not established significance thresholds for $PM_{2.5}$. The VCAPCD has not established mitigation thresholds for PM_{10} or $PM_{2.5}$ emissions from construction activities in Ventura County.

Table 4.6-18 Comparison of PM10 Construction Emissions to SCAQMD Significance Thresholds

Emission Source/Threshold	PM_{10} Daily Emissions (lbs/day)	PM_{10} Quarterly Emissions (tons/quarter)
Onshore pipeline installation		
Trenching	21	0.32
Pipelaying	143	2.0
HDD	65	0.5
Worker commuting	0.9	0.05
Subtotal	230	2.9
SCAQMD significance threshold	***150***	***6.75***

Source: SCAQMD 1993.

A dispersion modeling analysis was performed to determine the ambient impacts due to criteria pollutant emissions from offshore and onshore construction activities. The analysis indicates that increases in ambient PM_{10} and $PM_{2.5}$ concentrations caused by onshore construction emissions would further contribute to exceedances of NAAQS and/or State Ambient Air Quality Standards. The analysis further indicates that ambient PM_{10} and $PM_{2.5}$ impacts are primarily due to fugitive dust emissions, with the highest impacts occurring in close proximity to the construction areas. The emissions used in the impact analysis incorporate methods for fugitive dust control. A detailed summary of the screening analysis is presented in Appendix G5.

The USEPA has concluded that long-term (chronic) exposure to diesel particulate matter (DPM), i.e., particulate matter due to the combustion of diesel fuel, is likely to pose a lung cancer hazard as well as damage the lung in other ways depending on exposure. As a listed air toxic in California, DPM was included in a health risk analysis of onshore construction-related emissions. The analysis indicates that the exposure to DPM (and other air toxics) from construction activities would result in additional cancer risk of less than 1×10^{-5} and chronic index of less than 1.

The chronic exposures were based on expected durations of construction activities (relative to exposure to any single receptor). However, the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) states "Short-term high exposures are not necessarily equivalent to longer-term lower exposures even when the total dose is the same. OEHHA therefore does not support the use of current cancer potency factor to evaluate cancer risk for exposures of less

than 9 years. If such risk must be evaluated, we recommend assuming that average daily dose for short-term exposure is assumed to last for a minimum of 9 years" (OEHHA 2003). Given that construction activities would be transient and would impact specific locations for only limited durations, the assumption of nine years of exposure greatly overestimates the potential long-term cancer risks to sensitive receptors and the general public. The analysis is summarized in Appendix G6. Further discussion on emissions of air toxics, including DPM, from construction activities is discussed below under Impact AIR-9.

Since Project-related construction emissions have the potential to cause ambient particulate concentrations to exceed NAAQS or State Ambient Air Quality Standards, this impact is classified as a Class I impact.

In order to reduce fugitive dust emissions, the Applicant has incorporated the following measures into the Project:

AM AIR-2a. **Fugitive Dust Controls.** The Applicant or its designated representative would provide for the following control measures:

- Excavation and spoils would be watered down;
- Spoil piles that remain more than a few weeks would be covered with tarps;
- Water trucks would be used for dust suppression; and
- Disturbed areas not covered with surface structures, such as buildings and pavements, would be stabilized following construction activities. This stabilization may involve planting these areas with suitable vegetation to minimize future on-site soil loss and off-site sedimentation.

Mitigation Measures for Impact AIR-2: Violations of Ambient Air Quality Standards Caused by Particulate Emissions from Onshore Construction Activities

MM AIR-2b. **Construction Fugitive Dust Plan**. The Applicant or its designated representative shall be required to develop, and submit to the VCAPCD and the SCAQMD for approval, a Construction Fugitive Dust Control Plan prior to the commencement of construction activities. The plan shall be incorporated into all contracts and contract specifications for construction work. At a minimum, the control measures specified in the plan shall include Applicant measures and conform to all applicable requirements of SCAQMD Rule 403 (as listed for large construction operations) in both Ventura and Los Angeles counties. The plan shall outline the steps to be taken to minimize fugitive dust generated by construction activities by:

- Describing each active operation(s) that may result in the generation of fugitive dust;
- Identifying all sources of fugitive dust, e.g., earth moving, storage piles, vehicular traffic; and
- Describing the control measures to be applied to each of the sources of dust emissions identified above. The descriptions shall be sufficiently detailed to demonstrate that the best available control measure(s) required by the SCAQMD and the VCAPCD for linear projects will be used and/or installed during all periods of active operations.
- Stipulating the use of the following control measures, in addition to or as listed in SCAQMD Rule 403, such as, but not limited to:
  - Use of street sweeping and trackout devices at all construction sites.
  - Frequent watering or stabilization of excavation, spoils, access roads, storage piles, and other sources of fugitive dust.
  - Installing temporary coverings on storage piles when not in use.
  - Pre-watering of soils prior to trenching.
  - Dedicating water truck or high-capacity hose to any soil screening operations.
  - Minimizing drop height of material through screening equipment.

Due to potential exceedances of applicable air quality standards, this plan shall also identify specific methodologies for taking "real-time" measurements of PM_{10} and $PM_{2.5}$ ambient concentrations at locations along the boundary of the proposed construction areas. The plan shall include a description of "action levels" for these measurements and the corresponding steps to be taken, e.g., increase watering to reduce ambient particulate concentrations. The specified monitoring methodologies included in this plan must meet the approval of the VCAPCD and the SCAQMD. The Applicant or its designated representative shall submit this plan and related construction contract specifications to the CSLC, the USEPA and, to the extent applicable under local rules and regulations, the VCAPCD and the SCAQMD.

The Applicant or its designated representative shall obtain prior approval from the SCAQMD or the VCAPCD prior to any deviations from fugitive dust control measures specified in the Construction Fugitive Dust Plan. A justification statement used to explain the

technical or safety reason(s) that preclude the use of required fugitive dust control measure(s) shall be submitted to the appropriate agency for review.

MM AIR-1e. **USEPA Tier 3 Nonroad Engine Standards** would apply to this impact.

MM AIR-1f. **Construction Emissions Reduction Plan** would apply to this impact.

MM AIR-1g. **Construction Equipment Documentation** would apply to this impact.

Implementation of the Construction Emissions Reduction Plan and other mitigation measures would lead to the use of equipment engines and control equipment that would emit less DPM (PM_{10} and $PM_{2.5}$).

Measures required under the Construction Fugitive Dust Plan would serve to limit, to the extent feasible, the generation of fugitive dust caused by construction activities. Emission reductions for fugitive PM_{10} and $PM_{2.5}$ associated with this mitigation measure have already been incorporated into current emission estimates.

In addition to emission reduction measures, the Applicant would be required to monitor ambient concentrations of PM_{10} and $PM_{2.5}$ during construction activities and take appropriate actions to avoid violations of ambient air quality standards. Despite these mitigation measures, the potential for onshore construction activities (primarily in the form of fugitive dust emissions) to cause an exceedance of applicable ambient air quality standards would remain a Class I impact.

Impact AIR-3: Violations of Ambient Air Quality Standards, Exposure of the Public to Substantial Pollutant Concentrations, and/or Creation of Objectionable Odors Caused by an Accidental LNG Spill or Pipeline Rupture

Although rare, an LNG spill from the FSRU or a pipeline rupture would result in a natural gas release and/or a fire that could cause temporary increases in ambient air concentrations of criteria pollutants in excess of air quality standards, expose sensitive receptors and the general public to substantial concentrations of toxic air contaminants, and/or create objectionable odors (CEQA Class I; NEPA moderate adverse, short-term).

The accident scenarios evaluated in Section 4.2, "Public Safety: Hazards and Risk Analysis," and the Independent Risk Assessment (Appendix C1) include release and ignition of natural gas formed by evaporation of LNG spilled from the FSRU and from a rupture of the natural gas transmission pipelines. A release of natural gas would also result in release of odorants, i.e., mercaptans, which have been added to the gas for detection purposes. Complete combustion of natural gas would theoretically produce only CO_2, water, and heat. However, even under controlled conditions, e.g., in a flare, generator, or furnace, natural gas combustion typically is not complete. The products of

incomplete combustion of natural gas include criteria pollutants, ozone precursors, and toxic air contaminants.

A fire resulting from an LNG spill at the FSRU could result in a pool fire. Under this condition, it is unlikely that the fuel/air mix throughout the evaporating cloud would always be maintained at ideal levels to support complete combustion. The center of a large pool fire may often be fuel-rich (oxygen-deficient), which would result in the formation of soot. These minute solid carbon particles can increase the flame radiation (the amount of radiated heat), which can in turn increase the burning rate. In the hottest portions of the fire, secondary combustion of the soot is possible, which would reduce the amount of smoke produced by the fire. However, particulates can also be carried to cooler portions of the fire at the outer edges of the plume, transported upward to mix with relatively cooler air, or carried to regions of the plume where the fuel/air mix is too lean to burn.

The maximum increases in ambient pollutant concentrations due to the natural gas fire would occur in proximity to the LNG spill. During the fire, ambient air pollutant concentrations in the areas adjacent to the spill site (including nearby traffic lanes) could potentially exceed short-term, i.e., 1-hour to 24-hour, NAAQS and State Ambient Air Quality Standards over the duration of the fire. Air pollutant impacts could also be transported to onshore areas. However, given the distance to shore from a potential fire, it is unlikely that sensitive receptors, i.e., schools, day care centers, hospitals, retirement homes, convalescence facilities, and residences, would be exposed to substantial pollutant concentrations.

Pipeline accidents rarely, but do, occur. During an accidental rupture of the natural gas transmission line, natural gas would escape to the atmosphere or ignite, causing a fire. Under this scenario, the maximum increases in ambient pollutant concentrations would occur close to the pipeline rupture. A large leak of un-ignited natural gas would cause objectionable odors at locations downwind of the pipeline. During a fire, air pollutant concentrations could potentially exceed short-term, i.e., 1-hour to 24-hour, NAAQS and State Ambient Air Quality Standards in nearby areas. Depending on the size and location of the rupture, a fire or natural gas leak would also expose the public (including sensitive receptors) to substantial pollutant concentrations.

The Applicant has proposed the following measures to reduce the risk of an LNG spill or pipeline rupture (see Section 4.2, “Public Safety: Hazards and Risk Analysis," and Section 4.12, “Hazardous Materials,” for details):

AM PS-3a. **More Stringent Pipeline Design** would apply to this impact (see Section 4.2, “Public Safety: Hazards and Risk Analysis”).

AM PS-4a. **Class 3 Pipeline Design Criteria** would apply to this impact (see Section 4.2, “Public Safety: Hazards and Risk Analysis”).

Mitigation Measures for Impact AIR-3: Violations of Ambient Air Quality Standards, Exposure of the Public to Substantial Pollutant Concentrations, and/or Creation of Objectionable Odors Caused by an Accidental LNG Spill or Pipeline Rupture

MM PS-3c. **Areas Subject to Accelerated Corrosion, Cathodic Protection System** would apply to this impact (see Section 4.2, "Public Safety: Hazards and Risk Analysis").

MM PS-4c. **Install Additional Mainline Valves Equipped with Either Remote Valve Controls or Automatic Line Break Controls** would apply to this impact (see Section 4.2, "Public Safety: Hazards and Risk Analysis").

MM PS-4d. **Treat Shore Crossing as Pipeline HCA** would apply to this impact (see Section 4.2, "Public Safety: Hazards and Risk Analysis").

MM PS-4e. **Safety Marker Indicating the Presence of Buried Natural Gas Pipeline at Ormond Beach** would apply to this impact (see Section 4.2, "Public Safety: Hazards and Risk Analysis").

MM PS-4f. **Emergency Response** would apply to this impact (see Section 4.2, "Public Safety: Hazards and Risk Analysis").

MM PS-5a. **Treat Manufactured Home Residential Community as a High Consequence Area** would apply to this impact (see Section 4.2, "Public Safety: Hazards and Risk Analysis").

Applicant measures AM PS-3a and AM PS-4a and mitigation measure MM PS-3c would reduce the likelihood of leaks of natural gas that could result in pipeline accidents. MM PS-4c would limit the affected area from a potential pipeline accident. MM PS-4e would improve the detection of natural gas leaks. Mitigation Measures PS-4d and PS-5a would improve the integrity of the pipeline where people would be located. MM PS-4f would improve the effectiveness of emergency response to an accident if it were to occur. However, this impact would exceed air quality significance criteria after application of these mitigation measures and would therefore remain a Class I impact.

Impact AIR-4: Emissions of Ozone Precursors from the FSRU

Emissions of NO_x and ROC generated from FSRU and LNG carrier equipment could contribute to ambient ozone impacts in the areas located downwind of the Project (CEQA Class II; NEPA minor adverse, long-term).

FSRU equipment would generate emissions of ozone precursors NO_x and ROCs during start-up conditions and normal operations. Ozone precursor emissions would also be emitted from LNG carrier engines, used to power the LNG transfer pumps during offloading of LNG from a carrier to the FSRU. The CARB states a concern that "these emissions [from offshore activities] can reach the California coastline and add to the air pollution burden of downwind regions, e.g., South Coast Air Basin . . ." (Simeroth

2005). As discussed in Section 4.6.2, the USEPA has issued a proposed CAA permit (Authority to Construct) for the FSRU. In its regulatory analysis, the USEPA concluded that VCAPCD Rule 26.2 would not apply to the FSRU (USEPA 2006b); therefore, emission offsets would not be required for the FSRU. The USEPA further concluded that the FSRU would not trigger the requirements of Prevention of Significant Deterioration (PSD) because potential emissions are less than PSD major source thresholds (USEPA 2006b).

To minimize air quality impacts, the Applicant incorporated the following measure into the proposed Project:

AM AIR-4a. **Emissions Reduction Programs.** As part of air permit-to-construct application procedures, the Applicant has committed to the USEPA to achieve emissions reductions (in addition to reductions inherent to the Project) to an amount equal to the FSRU's annual NO_x emissions. The Applicant has executed contracts to retrofit two marine vessels (long haul tugs) by replacing the propulsion engines of each vessel with modern low emitting engines (Tier 2 compliant diesel-fired engines). At the request of the USEPA and the CARB, the Applicant conducted source testing to assist in determining the emission reductions expected as a result of the retrofits. The Applicant estimated that the repowering of two tugs could result in emission reductions of approximately 165.5 tons per year of NO_x.

In a memorandum from the CARB to the CSLC dated February 9, 2007, the CARB outlined the apportionment of the estimated NOx emission reductions based on the anticipated tug operations within the following regions:

Local Air District	*Emission Reductions (tons per year)*
SCAQMD	47.4
VCAPCD	16.8
Santa Barbara County APCD	35.6
San Luis Obispo County APCD	15.2
Monterey Bay Unified APCD	25.4
Bay Area AQMD	25.1
TOTAL	***165.5***

The CARB reviewed the methodology used to calculate the estimated emission reductions and found it to be reasonable. However, the CARB indicated that “there is not yet a consensus on the estimated emission reductions from the mitigation proposal and that the USEPA’s estimates are less than those presented here” (Fletcher 2007). The CARB memorandum is provided as Appendix G9.

The USEPA conducted its own review of the retrofit projects; based on the information submitted by the Applicant, the USEPA determined that the following emission reductions can be expected along the routes traveled by the tugs:

Local Air District	*Emission Reductions (tons per year)*
SCAQMD	33.15
VCAPCD	11.47
Santa Barbara County APCD	25.11
San Luis Obispo County APCD	10.84
Monterey Bay Unified APCD	18.09
Bay Area AQMD	17.99
TOTAL	***116.65***

Thus, the USEPA's estimate for NO_x reductions (116.65 tons per year) is less than the Applicant's estimate of NO_x reductions (165.5 tons per year) by a value of 48.85 tons per year.

Further, the CARB staff question the appropriateness of counting the emission reductions in the Bay Area since these reductions would likely not benefit the regions where the Project is located. Excluding the Bay Area emissions would reduce the amount of emission reductions by 25.1 tons per year based on estimates from the Applicant (or 17.99 tons per year based on estimates from the USEPA).

Based on the USEPA's and the CARB's estimates, the proposed Emissions Reduction Program (AM AIR-4a) would provide for NO_x emission reductions greater than the estimated annual NO_x emissions from FSRU equipment (66.1 tons per year). These NO_x emission reductions would likely be as effective in mitigating ambient ozone concentrations in onshore air basins as would corresponding NO_x emission reductions occurring at the FSRU. Thus, AM AIR-4a would reduce emissions of ozone precursors from the FSRU to below the significance criteria.

Impact AIR-5: Emissions of Ozone Precursors from Project Vessels Operating in California Coastal Waters

Emissions of NO_x and ROC generated from LNG carriers, tugboats, and the crew/supply boat operating in California Coastal Waters could contribute to ambient ozone impacts in the areas located downwind of the Project (CEQA Class I; NEPA major adverse, long-term).

LNG carriers, tugboats, and the crew/supply boat would generate emissions of ozone precursors, NO_x, and ROCs, during operation in California Coastal Waters. The CARB states that it "has jurisdiction within California Coastal Waters as discussed in the

documents 'Report to the California Legislature on Air Pollutant Emissions from Marine Vessels, June 1984, Volume 7, Appendix H and Appendix J'" (Simeroth 2005).

Excluding emissions generated for operation of LNG transfer pumps during offloading of LNG from a carrier to the FSRU, the total annual NO_x and ROC emissions from Project vessels operating in California Coastal Waters would be 84.4 and 28.2 tons per year, respectively. Of these totals, annual NO_x and ROC emissions within Ventura County waters would be 0.28 and 0.12 tons per year, respectively. All other vessel emissions would occur outside the boundary of any California county.

The greatest level of Project vessel operation in Ventura County waters would occur on days when both a tugboat and a crew/supply boat make transits between the FSRU and Port Hueneme. Under this situation, the daily NO_x and ROC emissions from Project vessels would be 10 and 3.6 pounds per day, respectively. Thus, daily NO_x emissions are expected to be less than the significance threshold of 25 pounds per day established by the VCAPCD.

As discussed under Impact AIR-4, the CARB is concerned about impacts downwind of emissions from all offshore Project activities. Thus, the CARB has stated, "For purposes of this project, ARB staff believes it is appropriate to mitigate the emissions from marine operations that occur within 25 nautical miles of the California mainland coastline. We believe this will address the majority of emissions from the proposed project and maximize the potential on-shore benefits…Although ARB has not established relevant significance criteria, these emissions clearly exceed the 'significance thresholds' of 55 pounds per day for NO_x emissions that the SCAQMD, the district most affected, has established" (Simeroth 2005).

To minimize emissions and subsequent air quality impacts, the Applicant incorporated the following measures into the proposed Project:

AM AIR-5a. **Natural Gas on LNG Carriers.** The Applicant would use natural gas as the primary fuel in LNG carrier engines whenever these vessels are berthed at the FSRU and/or operating within California Coastal Waters. A small amount of ultra low sulfur diesel would be used simultaneously as a pilot fuel in LNG carrier engines resulting in a fuel mixture with a natural gas-to-diesel ratio of approximately 99 to 1. All LNG carriers that deliver LNG to the FSRU would be powered exclusively by Wartsila 50DF series dual fuel electric engines or equivalent dual-fuel electric engines.

AM AIR-5b. **Control Equipment on Support Vessels.** The Applicant would use ultra low sulfur diesel as the fuel in the engines on the tugboats and crew/supply boat. The diesel engines on these vessels would be fitted with pollution control equipment including SCR, oxidation catalysts, and particulate filters to reduce emissions. The Applicant assumed a NO_x control efficiency of 80 percent in developing its emission inventories. The Applicant also expects CO and ROC

reductions of 70 percent and 40 percent, respectively. The use of this control equipment would result in emissions comparable to or less than emissions from natural gas-fueled engines.

Mitigation Measure for Impact AIR-5: Emissions of Ozone Precursors from Project Vessels Operating in California Coastal Waters

MM AIR-5c. **Documentation of Engine Specifications.** The Applicant shall prepare and maintain documentation that demonstrates implementation of the Applicant's emission reduction measures. The following documents and/or files shall be submitted to the USCG, CSLC, and CARB:

- Final design documents for the Project crew/supply boat and tug engines, including engine specifications, air pollution control equipment specifications, and associated manufacturer/vendor emission data.
- Documentation certifying that the actual emission rates for the Project crew/supply boat and tug engines are less than or equal to the "controlled" emission rates, in grams per kilowatt-hour, reported for these vessels and documented in Appendix G2. This documentation shall include a report summarizing emission testing of the newly constructed Project crew/supply boat and tug engines for NO_x, CO, ROC, and PM_{10}.
- Contract documents between the Applicant or its designated representative and LNG carrier operators that specify that all LNG carriers are powered exclusively by Wartsila 50DF series dual-fuel electric engines or equivalent dual-fuel electric engines. Equivalent air emission rates will be defined in grams per kilowatt-hour.
- Documentation of all LNG carriers that berth at the FSRU, which at a minimum, will include the vessel name, country of origin, engine power plant description, diesel specifications, and emission certifications.

The Applicant would reduce Project NO_x and ROC emissions through the use of natural gas in the engines of LNG carriers instead of the more typical diesel or heavy fuel oil (AM AIR-5a) and the use of air pollution control equipment reductions on the diesel-fueled tugboats and crew/supply boat (AM AIR-5b). Total annual NO_x and ROC emissions from Project vessels operating in California Coastal Waters would be 94 and 31 tons per year, respectively. Currently, no mitigation is identified for these emissions.

Under AM AIR-4a, the Applicant would retrofit engines on two marine vessels (long haul tugs) to reduce NO_x emissions. The CARB estimates that these engine retrofits would generate NO_x emission reductions of 140.4 tons per year that would benefit the regional area of the Project (outside of the Bay Area). The USEPA estimates that the retrofitting

of these vessels would result in NO_x emission reductions of 98.7 tons per year (outside of the Bay Area). As part of air permit-to-construct application procedures, the Applicant committed to the USEPA to achieve emissions reductions to an amount equal to annual NO_x emissions from FSRU equipment and LNG carrier engines used to power LNG transfer pumps (75.5 tons per year). Thus, total NO_x emission reductions designated as beneficial to the Project area, would exceed NO_x emissions from the FSRU/LNG pumping by a value of 64.9 tons per year according to the estimates outlined by the CARB or by 23.2 tons per year according to the estimates from the USEPA. These additional emission reductions would be less than the NO_x emissions estimated for Project vessels operating in California Coastal Waters by about 19.5 tons per year according to the CARB's estimates (or by 61.2 tons per year according to the USEPA's estimates). According to the CARB, the emission reduction proposal "represents more than what would otherwise be required by the current determination of applicable regulations" (Fletcher 2007).

The CARB has stated that total Project vessel emissions should be mitigated to the extent feasible and reasonable (Simeroth 2005). Its most recent evaluation states, in part, "ARB staff believe it is critical that air quality in the region be protected and that emission reduction measures be incorporated in the project so that the project's air quality impacts are mitigated" (Fletcher 2007). The Applicant does not propose measures to mitigate emissions from Project vessels operating in Federal waters/California Coastal Waters beyond those discussed above and will continue to consult with the CARB and the USEPA. Pending resolution among the CARB, the USEPA, and the Applicant, the status of this impact cannot be determined at this time. At present, the Project would result in a considerable net increase of ozone precursors, a Class I impact.

Impact AIR-6: Emissions of Ozone Precursors from Project Construction Activities in Federal Waters

Project construction activities in Federal waters would generate emissions of NO_x and ROCs that could contribute to ambient ozone impacts in the areas located downwind of the Project (CEQA Class III; NEPA minor adverse, short-term).

Project construction activities in Federal waters would generate emissions of ozone precursors, NO_x and ROCs. Federal waters are unclassified with respect to NAAQS; thus, significance thresholds set forth by the VCAPCD and the SCAQMD are not applicable in the determination of the significance of these emissions. In order to assess the significance of potential impacts, construction emissions that would be generated in Federal waters were compared with emission forecasts developed by the VCAPCD and the SCAQMD for offshore and onshore sources located in State and Federal Waters off the coast of Ventura County and the South Coast Air Basin (see Table 4.6-19).

Table 4.6-19 Comparison of Construction Emissions in Federal Waters to Region-Wide Emission Forecasts

Emission Source	Daily Emissions (tons per day)	
	NO_x	ROCs
Maximum daily construction emissions – offshore pipeline installation	2.9	0.4
Forecasts for daily regional offshore emissions (Outer Continental Shelf, tideland shipping, ships, and commercial boats)[a]	69.1	6.1
Forecasts for daily regional total emissions – all onshore and offshore sources[a]	831.8	673.6

Sources: VCAPCD 1995; SCAQMD 2003.

Notes:

[a]Ventura County and the South Coast Air Basin.

Table 4.6-19 indicates that Project construction emissions in Federal waters would represent approximately 4 and 7 percent of daily NO_x and ROC regional offshore emissions, respectively. The table also indicates that offshore construction emissions would represent approximately 0.4 and 0.06 percent of overall NO_x and ROC regional emissions, respectively. These emissions would occur for only a relatively short duration, i.e., 24 days for mooring installation and 35 days for offshore pipelaying; however, offshore construction activities are expected to occur during May through October, which is the period of historical high ozone concentrations for the region. Given the level of these emissions and the relatively short duration of construction, Project construction in Federal waters would not result in a cumulatively considerable net increase of ozone precursors, and thus, would not be expected to contribute substantially to existing ambient ground-level ozone impacts.

Mitigation Measure for Impact AIR-6: Emissions of Ozone Precursors from Project Construction Activities in Federal Waters

MM AIR-1f. **Construction Emissions Reduction Plan** would apply to this impact.

MM AIR-1g. **Construction Equipment Documentation** would apply to this impact.

The implementation of the Construction Emissions Reduction Plan would further reduce potential adverse impacts already considered not to exceed any significance criteria.

Impact AIR-7: Temporary Ambient Air Quality Impacts Caused by Criteria Pollutant Emissions from Onshore and Offshore Construction Activities

Air pollutants emitted during onshore and offshore Project construction activities would cause temporary increases in ambient pollutant concentrations (*CEQA *Class III*; NEPA minor adverse, short-term*).

Project construction activities would generate emissions of criteria pollutants. This impact discussion relates to SO_2 emissions generated from construction activities in

Ventura and Los Angeles counties, and criteria pollutant emissions, except ozone precursors (NO_x and ROC), generated from FSRU/mooring installation activities in Federal waters. Impacts related to emissions of ozone precursors, CO, PM_{10}, and $PM_{2.5}$ in Ventura and Los Angeles counties are discussed under Impacts AIR-1 and AIR-2. Emissions of ozone precursors generated from construction activities in Federal waters are discussed under Impact AIR-6.

An air quality analysis was performed to determine the ambient impacts due to emissions from onshore and offshore construction activities. The analysis indicates that potential increases of ambient pollutant concentrations caused by SO_2 emissions would not violate any air quality standards. Further, SO_2 emissions from construction in Los Angeles County are well below SCAQMD significance thresholds (the VCAPCD has not established SO_2 mitigation thresholds). The analysis also indicates that the potential increases in ambient pollutant concentrations caused by emissions from FSRU/mooring installation would neither violate any air quality standards nor contribute substantially to existing or projected air quality violations. A summary of this analysis is provided in Appendix G5.

Mitigation Measures for Impact AIR-7: Temporary Ambient Air Quality Impacts Caused by Air Pollutant Emissions from Onshore and Offshore Construction Activities

MM AIR-1f. **Construction Emissions Reduction Plan** would apply to this impact.

MM AIR-1g. **Construction Equipment Documentation** would apply to this impact.

Implementation of these mitigation measures would ensure the use of prescribed equipment engines and control equipment that would reduce air pollutant emissions. Thus, this mitigation measure would further reduce potential adverse impacts that would not exceed any significance criteria.

Impact AIR-8: Ambient Air Quality Impacts Caused by Air Pollutant Emissions from the FSRU and Project Vessels

Air pollutants emitted from FSRU equipment and Project vessels associated with operations would cause increases in ambient pollutant concentrations (*CEQA *Class III*; NEPA minor adverse, long-term*).

FSRU equipment and Project vessels, i.e., LNG carriers, tugboats, and crew boats, would emit air pollutants. This impact discussion relates to all air pollutant emissions related to operational activities except for ozone precursor (NO_x and ROCs) emissions from these activities (see Impacts AIR-4 and AIR-5).

The dispersion of air pollutants from these emission sources would cause an increase in the ambient air concentrations of each pollutant at downwind locations in the Pacific Ocean and along the coast of California. However, air quality analyses of criteria pollutants emitted from FSRU equipment and Project vessels indicates that the

projected increases in the ambient concentrations of criteria pollutants would neither violate any applicable air quality standards nor contribute substantially to existing or projected air quality violations. The analyses were conducted for emissions associated with Project operations and for start-up conditions (see Appendix G7 for summaries of the analyses).

A health risk analysis was performed to assess potential health risks to onshore receptors due to air toxic emissions from normal operation of FSRU and Project vessels. The analysis showed that the exposure to air toxics from operational activities would result in a maximum additional cancer risk of 1.81×10^{-7} and a maximum chronic hazard index (HIA) of 0.0046. These values are less than the health risk criteria for additional cancer risk and chronic HIA of 1×10^{-5} and 1, respectively.

The analysis indicated that the exposure to air toxics would result in a maximum acute HIA of 1.33. Emissions that cause impacts with a HIA of 1 have the potential for causing adverse impacts. Approximately 98 percent of the total HIA would be attributed to emissions of acrolein from natural gas-fueled engines on the FSRU and LNG carriers. The reference exposure level of acrolein, which was used to calculate the HIA, was developed to be protective of mild adverse effects, i.e., eye irritation. The analysis indicated that impacts would exceed a HIA of 1 only in unpopulated areas between Point Mugu and Point Dume and for no more than one to four hours per year. Due to these and additional factors, the analysis concluded that these impacts would not expose the public or sensitive receptors to substantial pollutant concentrations. A more detailed discussion of these factors and other results is provided in the health risk analysis summary in Appendix G6.

The analysis indicates that NH_3 emissions from FSRU equipment would result in projected increases in ambient NH_3 concentrations that would not exceed any of the stated significance criteria. The analysis was performed with SCREEN3. A summary of this analysis is provided in Appendix G8.

Based on the results of the analyses, ambient air quality impacts caused by air pollutant emissions from the FSRU and Project vessels would be a Class III impact.

Impact AIR-9: Temporary Ambient Air Quality Impacts Caused by Air Toxic Pollutant Emissions from Onshore and Offshore Construction Activities

Air toxic pollutants emitted during onshore and offshore Project construction activities would cause temporary increases in ambient pollutant concentrations (*CEQA *Class II; NEPA minor or moderate adverse, short-term).

Project construction activities would generate emissions of air toxic contaminants. A risk analysis was conducted to estimate the acute and chronic risks associated with air toxic emissions from onshore construction activities. A summary of the analysis is provided in Appendix G6. The analysis indicates that most chronic impacts from onshore construction would be due to DPM emissions. The analysis further indicates

that the chronic exposure to DPM (and other air toxics) from construction activities would be below significance levels (see Impact AIR-2).

The risk analysis indicates that unmitigated air toxic emissions during pipelay and drilling activities could result in a total HIA between 1 and 1.2. The HIA from the emissions from other onshore construction activities were predicted to be less than 1. For pipelay activities, the maximum impacts occur right along the pipeline corridor with the HIA dropping below 1 at distances of 50 meters (150 feet) away from construction activity. For drilling activities, the maximum impacts are also at the boundary of construction activities with the HIA dropping below 1 at 75 meters (250 feet) away from the construction boundary. The analysis indicated that most acute impacts would be due to acrolein and formaldehyde. Approximately 85 percent and 10 percent of the total HIA are attributed to emissions of acrolein and formaldehyde, respectively.

An analysis of air toxic emission impacts on ambient air quality from offshore construction activities was not conducted. Given the distance from offshore construction activities to the nearest onshore receptors (~1000 meters), potential increases in the ambient concentrations of air toxics emitted from offshore construction activities would not be expected to result in an adverse impact on onshore receptors.

Emissions of lead (a listed air toxic pollutant) from construction in Los Angeles County are well below SCAQMD significance thresholds for lead. The VCAPCD has not established mitigation thresholds for lead.

Mitigation Measures for Impact AIR-9: Temporary Ambient Air Quality Impacts Caused by Air Toxic Pollutant Emissions from Onshore and Offshore Construction Activities

MM AIR-1e. **USEPA Tier 3 Nonroad Engine Standards** would apply to this impact.

MM AIR-1f. **Construction Emissions Reduction Plan** would apply to this impact.

MM AIR-1g. **Construction Equipment Documentation** would apply to this impact.

Implementation of these mitigation measures would ensure the use of prescribed equipment engines and control equipment that would emit fewer air pollutants. The measures are estimated to reduce potential volatile hydrocarbons, including acrolein and formaldehyde, by 30 to 50 percent. Thus, implementation of these mitigation measures would reduce the hazard acute index of onshore pipelay and drilling activities to below the criteria level of 1, and the impact would be below the significance criteria.

Impacts, Applicant measures, and mitigation measures associated with air quality are summarized in Table 4.6-20.

Table 4.6-20 Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
Impact AIR-1: *Net Emission Increases of Criteria Pollutants from Construction Activities in Designated Nonattainment Areas* Project construction activities in Ventura and Los Angeles Counties would generate emissions that exceed quantitative thresholds for ozone precursors (NO_x and ROCs) and CO (CEQA Class I; NEPA major adverse, short-term).	**AM AIR-1a. USEPA Nonroad Engine Standards**. At a minimum, all onshore construction equipment would utilize engines compliant with USEPA Tier 2 nonroad engine standards. To the extent possible, onshore equipment would utilize engines compliant with USEPA Tier 3 or 4 nonroad engine standards. **AM AIR-1b. Offshore Construction Equipment Standards.** All vessels (and associated offshore equipment) used during shore crossing construction, offshore pipeline installation, and mooring/FSRU installation, would utilize only engines that emit CO, PM, NO_x, and ROC at rates less than or equal to USEPA Tier 1 nonroad engine standards (as outlined in 40 CFR 89.112, Table 1). **AM AIR-1c. Ultra Low Sulfur Diesel.** All Project operational vessels (including LNG carrier, tugs, and crew boat), FSRU equipment, and construction vessels and equipment would be fueled with ultra low sulfur diesel (less than 15 parts per million sulfur). This is consistent with California regulations (starting January 2007) that require that the sulfur content of all vehicular diesel fuel and non-vehicular diesel fuel supplied in California (including fuel for locomotives and harborcraft) not exceed 15 parts per million by weight. As it is anticipated that some of the operational and construction vessels/equipment would be transported from outside of California, this measure applies to vessels regardless of place of origin. **MM AIR-1d. Gasoline-Fueled Equipment.** The Applicant or its designated representative shall use only gasoline-fueled equipment that meets the exhaust emission standards for CO and NO_x (as listed for engine displacements greater than 1.0 liter) outlined in 13 CCR § 2433: Exhaust Emission Standards and Test Procedures – Off-Road Large Spark-Ignition Engines. **MM AIR-1e. USEPA Tier 3 Nonroad Engine Standards.** All onshore construction equipment with a rating between 100 and 750 hp would be required to utilize engines compliant with USEPA Tier 3 nonroad engine standards. **MM AIR-1f. Construction Emissions Reduction Plan.** The Applicant shall prepare a Construction Emissions Reduction Plan to be incorporated into all contracts and contract specifications for construction work. This plan shall specify all Applicant measures and mitigation measures related to construction equipment emission standards/controls as contractual requirements. The plan shall also outline additional specific measures, as contractual requirements, to reduce or eliminate potential

Table 4.6-20 Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
	impacts associated with construction-related emissions of criteria air pollutants and toxic air contaminants. At a minimum, the plan shall include the following additional specific measures: • As feasible, reduce emissions of diesel particulate matter (DPM) and other pollutants by using alternative clean fuel technology such as electric, hydrogen fuel cells, and propane-powered equipment or compressed natural gas-powered equipment with oxidation catalysts instead of gasoline- or diesel-powered engines. • Ensure that all construction equipment is properly tuned and maintained and shut off when not in direct use; • Prohibit engine tampering to increase horsepower; • Locate engines, motors, and equipment as far as possible from residential areas and at least 300 feet (91 m) from sensitive receptors, such as schools, daycare centers, and hospitals (Note: the proposed pipeline routes would not pass within 300 feet [91 m] of any sensitive receptor locations); • Provide carpool shuttles and vans to transport construction workers to and from construction sites, thus eliminating some private vehicle trips; • Arrange for food catering trucks to visit each Project site twice a day; • Reduce construction-related trips of workers and equipment, including trucks; and • Require that on-road vehicles be less than 10 years old. Prior to finalization of the plan, the Applicant shall also consult with the VCAPCD and SCAQMD to identify other potential control measures not specified above. The Applicant or its designated representative shall submit this plan and related construction contract specifications to the California State Lands Commission (CSLC), USEPA, and to the extent applicable under local rules and regulations, VCAPCD and SCAQMD, prior to construction activities. **MM AIR-1g. Construction Equipment Documentation.** The Applicant or its designated representative shall prepare and maintain documentation that demonstrates implementation of the Applicant's proposed emission reduction measures and required mitigation measures. The following documents and/or files shall be submitted to the CSLC, USEPA, and to the extent applicable under local rules and regulations, VCAPCD and

Table 4.6-20 Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
	SCAQMD: • Inventory of all equipment and vessels used during each onshore and offshore construction activity. At a minimum, this inventory shall include an equipment description, equipment identification, identification of type of engine(s), and engine emission data; and • Documentation certifying that the actual emission rates for the engine(s) of each equipment and vessel used during construction comply with mitigation measures and applicant measures as required. This documentation shall include USEPA or CARB certification of engine emissions, source testing results for specific engines, or an equivalent means of certifying emission rates of NO_x, CO, ROC, and PM_{10} from this equipment.
Impact AIR-2: *Violations of Ambient Air Quality Standards Causes by Particulate Emissions from Onshore Construction Activities* Onshore Project construction activities would generate PM_{10} and $PM_{2.5}$ emissions that could cause or contribute to existing or projected violations of NAAQS and/or State Ambient Air Quality Standards (CEQA Class I; NEPA major adverse, short-term).	**AM AIR-2a. Fugitive Dust Controls.** The Applicant or its designated representative would provide for the following control measures: • Excavation and spoils would be watered down; • Spoil piles that remain more than a few weeks would be covered with tarps; • Water trucks would be used for dust suppression; and • Disturbed areas not covered with surface structures, such as buildings and pavements, would be stabilized following construction activities. This stabilization may involve planting these areas with suitable vegetation to minimize future on-site soil loss and off-site sedimentation. **MM AIR-2b. Construction Fugitive Dust Plan**. The Applicant or its designated representative shall be required to develop, and submit to the VCAPCD and the SCAQMD for approval, a Construction Fugitive Dust Control Plan prior to the commencement of construction activities. The plan shall be incorporated into all contracts and contract specifications for construction work. At a minimum, the control measures specified in the plan shall include Applicant measures and conform to all applicable requirements of SCAQMD Rule 403 (as listed for large construction operations) in both Ventura and Los Angeles counties. The plan shall outline the steps to be taken to minimize fugitive dust generated by construction activities by: • Describing each active operation(s) that may result in the generation of fugitive dust; • Identifying all sources of fugitive dust, e.g., earth moving, storage piles, vehicular traffic; and • Describing the control measures to be applied to

Table 4.6-20 Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
	each of the sources of dust emissions identified above. The descriptions shall be sufficiently detailed to demonstrate that the best available control measure(s) required by the SCAQMD and the VCAPCD for linear projects will be used and/or installed during all periods of active operations. • Stipulating the use of the following control measures, in addition to or as listed in SCAQMD Rule 403, such as, but not limited to: - Use of street sweeping and trackout devices at all construction sites. - Frequent watering or stabilization of excavation, spoils, access roads, storage piles, and other sources of fugitive dust. - Installing temporary coverings on storage piles when not in use. - Pre-watering of soils prior to trenching. - Dedicating water truck or high capacity hose to any soil screening operations. - Minimizing drop height of material through screening equipment. **MM AIR-1e. USEPA Tier 3 Nonroad Engine Standards**. **MM AIR-1f. Construction Emissions Reduction Plan.** **MM AIR-1g. Construction Equipment Documentation**.
Impact AIR-3: *Violations of Ambient Air Quality Standards, Exposure of the Public to Substantial Pollutant Concentrations, and/or Creation of Objectionable Odors Caused by an Accidental LNG Spill or Pipeline Rupture* Although rare, an LNG spill from the FSRU or a pipeline rupture would result in a natural gas release and/or a fire that could cause temporary increases in ambient air concentrations of criteria pollutants in excess of air quality standards, expose sensitive receptors and the general public to substantial concentrations of toxic air contaminants, and/or create objectionable odors (CEQA Class I; NEPA moderate adverse, short-term).	**AM PS-3a**. **More Stringent Pipeline Design** (see Section 4.2, "Public Safety: Hazards and Risk Analysis"). **AM PS-4a**. **Class 3 Pipeline Design Criteria** (see Section 4.2, "Public Safety: Hazards and Risk Analysis"). **MM PS-3c. Areas Subject to Accelerated Corrosion, Cathodic Protection System** (see Section 4.2, "Public Safety: Hazards and Risk Analysis"). **MM PS-4c. Install Additional Mainline Valves Equipped with Either Remote Valve Controls or Automatic Line Break Controls** (see Section 4.2, "Public Safety: Hazards and Risk Analysis"). **MM PS-4d. Treat Shore Crossing as Pipeline HCA** (see Section 4.2, "Public Safety: Hazards and Risk Analysis"). **MM PS-4e. Safety Marker Indicating the Presence of Buried Natural Gas Pipeline at Ormond Beach** (see Section 4.2, "Public Safety: Hazards and Risk Analysis"). **MM PS-4f. Emergency Response** (see Section 4.2,

Table 4.6-20 Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
	"Public Safety: Hazards and Risk Analysis"). **MM PS-5a. Treat Manufactured Home Residential Community as a High Consequence Area** (see Section 4.2, "Public Safety: Hazards and Risk Analysis").
Impact AIR-4: *Emissions of Ozone Precursors from the FSRU* Emissions of NO_x and ROC generated from FSRU and LNG carrier equipment could contribute to ambient ozone impacts in the areas located downwind of the Project (CEQA Class II; NEPA minor adverse, long-term).	**AM AIR-4a. Emissions Reduction Programs.** As part of air permit-to-construct application procedures, the Applicant has committed to the USEPA to achieve emissions reductions (in addition to reductions inherent to the Project) to an amount equal to the FSRU's annual NO_x emissions. The Applicant has executed contracts to retrofit two marine vessels (long haul tugs) by replacing the propulsion engines of each vessel with modern low emitting engines (Tier 2 compliant diesel-fired engines). At the request of the USEPA and the CARB, the Applicant conducted source testing to assist in determining the emission reductions expected as a result of the retrofits. The Applicant estimated that the repowering of two tugs could result in emission reductions of approximately 165.5 tons per year of NO_x. In a memorandum from the CARB to the CSLC dated February 9, 2007, the CARB outlined the apportionment of the estimated NOx emission reductions based on the anticipated tug operations within the following regions: *Emission Reductions* *Local Air District* — *(tons per year)* SCAQMD — 47.4 VCAPCD — 16.8 Santa Barbara County APCD — 35.6 San Luis Obispo County APCD — 15.2 Monterey Bay Unified APCD — 25.4 Bay Area AQMD — 25.1 ***TOTAL*** — ***165.5*** The CARB reviewed the methodology used to calculate the estimated emission reductions and found it to be reasonable. However, the CARB indicated that, "there is not yet a consensus on the estimated emission reductions from the mitigation proposal and that the USEPA's estimates are less than those presented here" (Fletcher 2007). A copy of the CARB memorandum is provided as Appendix G9. The USEPA conducted its own review of the retrofit projects; based on the information submitted by the Applicant, the USEPA determined that the following emission reductions can be expected along the routes traveled by the tugs:

Table 4.6-20 Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
	Emission Reductions *Local Air District* — *(tons per year)* SCAQMD — 33.15 VCAPCD — 11.47 Santa Barbara County APCD — 25.11 San Luis Obispo County APCD — 10.84 Monterey Bay Unified APCD — 18.09 Bay Area AQMD — 17.99 ***TOTAL*** — ***116.65*** Thus, the USEPA's estimate for NO_x reductions (116.65 tons per year) is less than the Applicant's estimate of NO_x reductions (165.5 tons per year) by a value of 48.85 tons per year. Further, the CARB staff question the appropriateness of counting the emission reductions in the Bay Area since these reductions would likely not benefit the regions where the Project is located. Excluding the Bay Area emissions would reduce the amount of emission reductions by 25.1 tons per year based on estimates from the Applicant (or 17.99 tons per year based on estimates from the USEPA).
Impact AIR-5: *Emissions of Ozone Precursors from Project Vessels Operating in California Coastal Waters* Emissions of NO_x and ROC generated from LNG carriers, tugboats, and the crew/supply boat operating in California Coastal Waters could contribute to ambient ozone impacts in the areas located downwind of the Project (CEQA Class I; NEPA major adverse, long-term).	**AM AIR-5a. Natural Gas on LNG Carriers.** The Applicant would use natural gas as the primary fuel in LNG carrier engines, whenever these vessels are berthed at the FSRU and/or operating within California Coastal Waters. A small amount of ultra low sulfur diesel would be used simultaneously as a pilot fuel in LNG carrier engines resulting in a fuel mixture with a natural gas-to-diesel ratio of approximately 99 to 1. All LNG carriers that deliver LNG to the FSRU would be powered exclusively by Wartsila 50DF series dual-fuel electric engines or equivalent dual-fuel electric engines. **AM AIR-5b. Control Equipment on Support Vessels.** The Applicant would use ultra low sulfur diesel as the fuel in the engines on the tugboats and crew/supply boat. The diesel engines on these vessels would be fitted with pollution control equipment including SCR, oxidation catalysts, and particulate filters to reduce emissions. The Applicant assumed a NO_x control efficiency of 80 percent in developing its emission inventories. The Applicant also expects CO and ROC reductions of 70 percent and 40 percent, respectively. The use of this control equipment would result in emissions comparable to or less than emissions from natural gas-fueled engines. **MM AIR-5c. Documentation of Engine Specifications.** The Applicant shall prepare and maintain documentation that demonstrates implementation of the Applicant's emission reduction

Table 4.6-20 Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
	measures. The following documents and/or files shall be submitted to the USCG, CSLC, and CARB: • Final design documents for the Project crew/supply boat and tug engines, including engine specifications, air pollution control equipment specifications, and associated manufacturer/vendor emission data. • Documentation certifying that the actual emission rates for the Project crew/supply boat and tug engines are less than or equal to the "controlled" emission rates, in grams per kilowatt-hour, reported for these vessels and documented in Appendix G2. This documentation shall include a report summarizing emission testing of the newly constructed Project crew/supply boat and tug engines for NO_x, CO, ROC, and PM_{10}. • Contract documents between the Applicant or its designated representative and LNG carrier operators that specify that all LNG carriers are powered exclusively by Wartsila 50DF series dual-fuel electric engines or equivalent dual-fuel electric engines. Equivalent air emission rates will be defined in grams per kilowatt-hour. • Documentation of all LNG carriers that berth at the FSRU, which at a minimum, will include the vessel name, country of origin, engine power plant description, diesel specifications, and emission certifications.
Impact AIR-6: *Emissions of Ozone Precursors from Project Construction Activities in Federal Waters* Project construction activities in Federal waters would generate emissions of NO_x and ROCs that could contribute to ambient ozone impacts in the areas located downwind of the Project (CEQA Class III; NEPA minor adverse, short-term).	**MM AIR-1f. Construction Emissions Reduction Plan**. **MM AIR-1g. Construction Equipment Documentation**.
Impact AIR-7: *Temporary Ambient Air Quality Impacts Caused by Criteria Pollutant Emissions from Onshore and Offshore Construction Activities* Air pollutants emitted during onshore and offshore Project construction activities would cause temporary increases in ambient pollutant concentrations (CEQA Class III; NEPA minor adverse, short-term).	**MM AIR-1f. Construction Emissions Reduction Plan**. **MM AIR-1g. Construction Equipment Documentation**.
Impact AIR-8: *Ambient Air Quality Impacts Caused by Air Pollutant Emissions from the FSRU and Project Vessels* Air pollutants emitted from FSRU equipment and Project vessels associated with operations would cause increases in ambient pollutant	None.

Table 4.6-20 Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
concentrations (CEQA Class III; NEPA minor adverse, long-term).	
Impact AIR-9: *Temporary Ambient Air Quality Impacts Caused by Air Toxic Pollutant Emissions from Onshore and Offshore Construction Activities* Air toxic pollutants emitted during onshore and offshore Project construction activities would cause temporary increases in ambient pollutant concentrations (CEQA Class II, NEPA minor or moderate adverse, short term).	**MM AIR-1e. USEPA Tier 3 Nonroad Engine Standards**. **MM AIR-1f. Construction Emissions Reduction Plan**. ***MM AIR-1g. Construction Equipment Documentation.***

4.6.5 Alternatives

4.6.5.1 No Action Alternative

As explained in greater detail in Section 3.4.1, under the No Action Alternative, MARAD would deny the license for the Cabrillo Port Project, the Governor of California would disapprove the Project under the provisions of the DWPA, or the CSLC would deny the application for the proposed lease of State tide and submerged lands for a pipeline right-of-way. Any of these actions or disapproval by any other permitting agency could result in the Project not proceeding. The No Action Alternative means that the Project would not go forward and the FSRU, associated subsea pipelines, and onshore pipelines and related facilities would not be installed. Accordingly, none of the potential impacts on air quality identified for the construction and operation of the proposed Project would occur.

Specifically, potential impacts that would not occur if the No Action Alternative is implemented include the following:

- Permitted emission of 290 tons of CO, 200 tons of NO_x, 25 tons of PM_{10}, 15 tons of $PM_{2.5}$, 35 tons of ROCs, and 0.37 tons of SO_2 during construction;
- Annual permitted emission of 245.5 tons of CO, 6.1 tons of NH_3, 159.9 tons of NO_x, 16.7 tons of PM_{10}, 16.7 tons of $PM_{2.5}$, 59.8 tons of ROCs, and 0.6 tons of SO_2 during 40 years of operations at the FSRU and Project vessels;
- Emissions of ozone precursors (NO_x and ROCs) and CO that could exceed quantitative thresholds for during onshore construction in Ventura and Los Angeles counties;
- Emissions of PM_{10} and $PM_{2.5}$ that could cause or contribute to existing or projected violations of NAAQS and/or State Ambient Air Quality Standards during construction;
- A natural gas release and/or a fire resulting from an LNG spill from the FSRU or a pipeline rupture that could cause temporary increases in ambient air concentrations of criteria pollutants in excess of air quality standards, expose

sensitive receptors and the general public to substantial concentrations of toxic air contaminants, and/or create objectionable odors;

- Emissions of NO_x and ROCs that could contribute to ambient ozone impacts in areas downwind of the Project during construction or operations;
- Temporary increases in ambient pollutant concentrations during onshore and offshore construction activities;
- Increases in ambient pollutant concentrations emitted from FSRU equipment and Project vessels during Project operations; and
- A temporary or long-term increase in ambient pollutant concentrations and toxic pollutant concentrations during construction or operations.

Since the proposed Project is privately funded, it is unknown whether the Applicant would proceed with another energy project in California; however, should the No Action Alternative be selected, the energy needs identified in Section 1.2, "Project Purpose, Need and Objectives," would likely be addressed through other means, such as through other LNG or natural gas-related pipeline projects. Such proposed projects may result in potential impacts on air quality similar in nature and magnitude to the proposed Project as well as impacts particular to the respective configurations and operations of each project; however, such impacts cannot be predicted with any certainty at this time.

4.6.5.2 Alternative Deepwater Port, Subsea Pipelines, Shore Crossing, and Onshore Pipeline Location – Santa Barbara Channel/Mandalay Shore Crossing/Gonzales Road Pipeline Alternative

Compared to the proposed Project, emissions generated from FSRU and vessel operation for this alternative would be unchanged, but would take place approximately 4 miles (6.4 km) closer to the California shoreline. In general, impacts on onshore locations are expected to increase slightly but with no anticipated change in the significance level of impact. An emissions reduction program would be used to reduce NO_x emissions from FSRU stationary sources to a Class II impact (Impact AIR-4). This measure would provide for emission reductions that could reduce impacts to below significance criteria, pending final USEPA analysis. If the USEPA determines such retrofits do not provide the necessary reductions, additional measures may be required to sustain this conclusion. As with the Project as proposed, the impact of ozone precursor emissions from Project vessels operating in California Coastal Waters (Impact AIR-5) would result in a considerable net increase of ozone precursors (Class I impact). The air quality impacts associated with the emissions of all other air pollutants from FSRU and vessel operation would not exceed any significance criteria and would be Class III impacts (Impact AIR-8).

Emissions generated from offshore construction in Federal waters for this alternative would be slightly less than Project emissions because of the shorter offshore pipeline route but these activities would take place closer to the California shoreline. Daily offshore emissions would remain equivalent to those for the Project. Although activities under this alternative would occur closer to the coastline, it is expected that the

differences in onshore ambient impacts would not affect the significance of the impacts, and therefore are unlikely to exceed air quality standards. The air quality impacts due to offshore construction would not exceed any significance criteria and would be Class III impacts (Impacts AIR-6, AIR-7, and AIR-9).

Compared to the Project, emissions generated over the course of onshore construction activities for this alternative would increase slightly because the pipeline route to the Center Road Valve Station would travel through a more densely populated area, resulting in a longer construction schedule. However, daily emissions would remain equivalent to those for the Project. Since air quality impacts are closely related to daily emissions, impacts from this alternative's onshore construction activities would be the same as those for the Project. Despite implementation of mitigation measures, NO_x and ROCs emissions (and CO emissions in Los Angeles County) would exceed significance thresholds, and $PM_{10}/PM_{2.5}$ emissions would have the potential to cause exceedances of ambient air quality standards. Therefore, these impacts (Impacts AIR-1 and AIR-2) would be Class I and the mitigation measures applied to the Project would also be implemented for this alternative. The air quality impacts from other air pollutants emitted during onshore construction would not exceed any significance criteria. Therefore, the impacts would be Class II with mitigation (Impact AIR-9) or Class III with no mitigation required, although MM AIR-1a through -1f would be applied (Impact AIR-7).

Under this alternative, air quality impacts caused by an LNG spill or pipeline rupture would be the same as those for the proposed Project. Despite implementation of mitigation measures, air quality impacts associated with these events could exceed ambient air quality standards, expose the public to substantial pollutant concentrations, and/or create objectionable odors. Therefore, these impacts (Impact AIR-3) would be Class I and the mitigation measures applied for the Project would also be implemented for this alternative.

4.6.5.3 Shore Crossing Alternatives

The air quality impacts associated with operational activities and offshore construction for the shore crossing alternatives would be identical to corresponding impacts for the proposed Project regardless of the shore crossing locations. Therefore, the following analysis reflects only the differences in impacts resulting from onshore construction activities.

Point Mugu Shore Crossing/Casper Road Pipeline Alternative

Under this alternative, the duration of shore crossing and pipeline construction would be equivalent to corresponding construction for the Project. Thus, construction emissions for this alternative would be the same as those for the Project. Despite implementation of mitigation measures, NO_x and ROCs emissions in combination with the emissions in the remainder of the pipeline route in Ventura County would exceed significance thresholds, and $PM_{10}/PM_{2.5}$ emissions would have the potential to cause exceedances of ambient air quality standards. Therefore, these impacts (Impacts AIR-1 and AIR-2)

would be Class I and the mitigation measures applied for the Project would also be implemented for this alternative. The air quality impacts from other air pollutants emitted during onshore construction would not exceed any significance criteria. Therefore, these impacts would be Class II with mitigation (Impact AIR-9) or Class III with no mitigation required, although MM AIR-1a through -1f would be applied (Impact AIR-7).

Arnold Road Shore Crossing/Arnold Road Pipeline Alternative

Under this alternative, the duration of shore crossing and pipeline construction would be equivalent to corresponding construction for the Project. Thus, construction emissions for this alternative would be the same as those for the Project. Despite implementation of mitigation measures, NO_x and ROCs emissions, in combination with the construction emissions on the remainder of the pipeline route in Ventura County, would exceed significance thresholds, and $PM_{10}/PM_{2.5}$ emissions would have the potential to cause exceedances of ambient air quality standards. Therefore, these impacts (Impacts AIR-1 and AIR-2) would be Class I and the mitigation measures applied for the Project would also be implemented for this alternative. The air quality impacts from other air pollutants emitted during onshore construction would not exceed any significance criteria. Therefore, these impacts would be Class II with mitigation (Impact AIR-9) or Class III with no mitigation required, although MM AIR-1a through -1f would be applied (Impact AIR-7).

4.6.5.4 Alternative Onshore Pipeline Routes

The air quality impacts associated with operational activities and offshore construction for the onshore pipeline route alternatives would be identical to corresponding impacts for the proposed Project regardless of the onshore pipeline route selected. Therefore, the following analysis compares only the differences in onshore construction activities.

Center Road Pipeline Alternative 1

The emissions generated over the course of onshore construction for this alternative would be equivalent to those generated from the Project because although the pipeline route would be longer, it would traverse less densely populated areas. Since air quality impacts are closely related to daily emissions, impacts from onshore construction under this alternative would be the same as those for the Project. Despite implementation of mitigation measures, NO_x and ROCs emissions would exceed significance thresholds, and $PM_{10}/PM_{2.5}$ dust emissions would have the potential to cause exceedances of ambient air quality standards. Therefore, these impacts (Impacts AIR-1 and AIR-2) would be Class I and the mitigation measures applied for the Project would also be implemented for this alternative. The air quality impacts from other air pollutants emitted during onshore construction would not exceed any significance criteria. Therefore, these impacts would be Class II with mitigation (Impact AIR-9) or Class III with no mitigation required although MM AIR-1a through -1f would be applied (Impact AIR-7).

Center Road Pipeline Alternative 2

Under this alternative, the duration of pipeline construction would be equivalent to the corresponding construction for the proposed Project. Thus, construction emissions for this alternative would be the same as those for the Project. Despite implementation of mitigation measures, NO_x and ROCs emissions would exceed significance thresholds, and $PM_{10}/PM_{2.5}$ emissions would have the potential to cause exceedances of ambient air quality standards. Therefore, these impacts would be Class I and the mitigation measures applied for the Project would also be implemented for this alternative. The air quality impacts from other air pollutants emitted during onshore construction would not exceed any significance criteria. Therefore, these impacts would be Class II with mitigation or Class III with no mitigation required although MM AIR-1a through -1f would be applied.

Center Road Pipeline Alternative 3

Under this alternative, the duration of pipeline construction would be equivalent to corresponding construction for the Project. Thus, construction emissions for this alternative would be the same as those for the Project. Despite implementation of mitigation measures, NO_x and ROCs emissions would exceed significance thresholds and $PM_{10}/PM_{2.5}$ emissions would have the potential to cause exceedances of ambient air quality standards. Therefore, these impacts (Impacts AIR-1 and AIR-2) would be Class I and the mitigation measures applied for the Project would also be implemented for this alternative. The air quality impacts from other air pollutants emitted during onshore construction would not exceed any significance criteria. Therefore, these impacts would be Class II with mitigation (Impact AIR-7) or Class III with no mitigation required although MM AIR-1a through -1f would be applied (Impact AIR-9).

Line 225 Pipeline Loop Alternative

As compared with the Project, the emissions generated over the course of onshore trenching and pipelay construction activities for this alternative would decrease slightly because the Line 225 Pipeline Loop route would be shorter and traverse more open land, resulting in a shorter construction schedule. However, daily emissions would remain equivalent to those for the Project. Since air quality impacts are closely related to daily emissions, impacts from onshore trenching and pipelay construction under this alternative would be the same as those for the Project.

Under the Project, the Line 225 Pipeline Loop would cross the Santa Clara River within the State Route 126 bridge. Under this alternative, the Line 225 Pipeline Loop would cross the Santa Clara River by either utilizing an existing pipe bridge or by drilling under the river with HDD. If HDD is used, emissions would increase because of additional equipment requirements. Installation of the pipeline beneath the Santa Clara River using HDD would take approximately three months.

Despite implementation of mitigation measures, NO_x, ROCs, and CO emissions would exceed significance thresholds and $PM_{10}/PM_{2.5}$ emissions would have the potential to

cause exceedances of ambient air quality standards. Therefore, these impacts (Impacts AIR-1 and AIR-2) would be Class I and the mitigation measures applied for the Project would also be implemented for this alternative. The air quality impacts from other air pollutants emitted during onshore construction would not exceed any significance criteria. Therefore, these impacts would be Class II with mitigation (Impact AIR-9) or Class III with no mitigation required although MM AIR-1a through -1f would be applied (Impact AIR-7).

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